



VINEYARD DESIGN
EROSION CONTROL
WATER DEVELOPMENT
DRAINAGE
PERMITTING
GPS/GIS

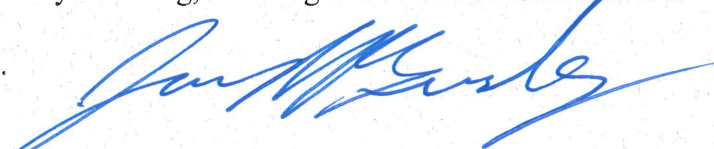
EXHIBIT C

2800 Jefferson Street
Napa, California 94558
707-253-1806
www.ppiengineering.com

MEMORANDUM

Date: July 11, 2018

To: Patrick Ryan, Napa County Planning, Building and Environmental Services

From: James R. Bushey, P.E.
Cody J. Corsetti, P.E. 

Cc: Brian Bordona, Napa County Planning, Building and Environmental Services

Re: Metamorphosis Wines LLC
Ovid Vineyards Track I ECP
APNs 032-030-065 & -066
Hydrologic Analysis

This memo transmits the findings of a hydrologic analysis for the above-referenced Track I Erosion Control Plan (ECP). HydroCAD software was used to estimate pre- and post-project runoff from watersheds containing the proposed development areas. The software uses the Natural Resource Conservation Service (NRCS) TR-20 method to calculate runoff. The analysis uses the Type IA 24-hr storm distribution and includes site-specific National Oceanic and Atmospheric Administration (NOAA) point precipitation data for the ranch.

Four (4) watersheds were delineated for the hydrologic modeling. Watershed 1 flows to an existing sediment basin that is located on the adjacent parcel. The northwest section of this watershed boundary is defined by an existing roadside ditch. Watershed 2 flows to an unnamed blue-line stream that eventually flows to Lake Hennessey. Watershed 3 flows to an unnamed blue-line stream that flows into Conn Creek further downstream. Watershed 4 flows to an ephemeral stream which in turn flows to the same blue-line stream that Watershed 3 flows into. Consequently, Watersheds 3 & 4 were analyzed both individually (at the watershed level) and jointly (at the common outlet along the blue-line stream). Please see the attached figures for the location of each watershed.

Soils within the watersheds were obtained from the NRCS Web Soil Survey and are classified as the following:

- Boomer Loam, 2-35% Slopes (Map Unit Symbol 107)
- Boomer Gravelly Loam, 14-60% Slopes (Map Unit Symbol 109)
- Hambright Rock-Outcrop Complex, 30-75% Slopes (Map Unit Symbol 152)
- Rock Outcrop-Hambright Complex, 50-75% Slopes (Map Unit Symbol 176)
- Sobrante Loam, 5-30% Slopes (Map Unit Symbol 178)

The Boomer Loam, Boomer Gravelly Loam and Sobrante Loam are classified as Hydrologic Soil Group (HSG) C. The Hambright Rock-Outcrop Complex and Rock Outcrop-Hambright Complex are classified as HSG D. Please see the attached figures for soil type delineations within the vicinity of each watershed.

Land use areas were initially delineated based on Napa County Orthophotos and both American Aerial Mapping and Napa County Contours. A site visit was then conducted on January 16, 2018 by Matt Bueno of PPI Engineering to ground truth the orthophotos and determine the existing land use conditions. The land use hydrologic conditions were classified based on the respective covers as poor (less than 50% cover), fair (50%-75% cover) or good (greater than or equal to 75% cover). The HydroCAD software analyzes the land use data along with the corresponding soil HSGs to determine a weighted Curve Number (CN) for runoff calculations. Please see the attached figures for existing and proposed land use delineations.

The Time of Concentration (Tc) flow path within each watershed was determined using both American Aerial Mapping and Napa County Contours. The flow path in each watershed was drafted from the hydrologically most distant point (longest travel time) in the watershed to the watershed outlet per NRCS standards. For Watersheds 1, 2 & 4 the Tc did not change from pre- to post-project conditions. The Tc flow path in each of these watersheds did not flow through any proposed drainage/erosion control elements when analyzed under post-project conditions. For Watershed 3 the proposed rock filled avenue/level spreader on the downhill side of proposed Block 2C resulted in Tc changes post-project. Please see the attached figures for both the pre- and post-project Tc flow paths by watershed.

As discussed above, Watersheds 3 & 4 were also analyzed jointly due to the fact that they are hydrologically connected. A single reach (Reach 1) was routed from the outlet of Watershed 4 to the common outlet point of Watershed 3. This reach did not change from pre- to post-project conditions. Please see the attached figures for the location of this single reach.

Pre- and post-project runoff calculations from the HydroCAD models for each individual watershed are summarized in Table 1 below. Runoff was calculated for the 2-, 10-, 50- and 100-year storms respectively for each watershed.

Table 1. Individual Watershed Summary

	Runoff (cfs)											
	Watershed 1			Watershed 2			Watershed 3			Watershed 4		
	Pre- Project	Post- Project	Increase/ Decrease	Pre- Project	Post- Project	Increase/ Decrease	Pre- Project	Post- Project	Increase/ Decrease	Pre- Project	Post- Project	Increase/ Decrease
2-Year Storm	27.25	27.25	0.00	25.24	25.24	0.00	37.37	35.18	2.19	26.34	26.34	0.00
10-Year Storm	51.37	51.37	0.00	51.23	51.23	0.00	77.78	73.67	4.11	52.31	52.31	0.00
50-Year Storm	77.08	77.08	0.00	79.85	79.85	0.00	122.33	116.54	5.79	80.75	80.75	0.00
100-Year Storm	88.01	88.01	0.00	92.18	92.18	0.00	141.69	135.10	6.59	92.97	92.97	0.00

With regards to the joint analysis of Watersheds 3 & 4, the respective inflows and outflows of Reach 1 are presented in Table 2 below for pre- and post-project conditions. Additionally, the calculated runoff at the common outlet point of both watersheds is presented in Table 3 below (again for both pre- and post-project conditions).

Table 2. Reach Summary

	Runoff (cfs)					
	Reach 1 Inflow			Reach 1 Outflow		
	Pre- Project	Post- Project	Increase/ Decrease	Pre- Project	Post- Project	Increase/ Decrease
2-Year Storm	26.34	26.34	0.00	25.76	25.76	0.00
10-Year Storm	52.31	52.31	0.00	51.72	51.72	0.00
50-Year Storm	80.75	80.75	0.00	80.20	80.20	0.00
100-Year Storm	92.97	92.97	0.00	92.44	92.44	0.00

Table 3. Watershed 3 & 4 Outlet Summary

	Runoff (cfs)		
	Watershed 3 & 4 Outlet		
	Pre- Project	Post- Project	Increase/ Decrease
2-Year Storm	62.14	60.91	1.23
10-Year Storm	128.31	125.39	2.92
50-Year Storm	201.53	196.72	4.81
100-Year Storm	233.13	227.50	5.63

At the individual watershed level, Watersheds 1, 2 & 4 show no net change in runoff from pre- to post-project conditions. This is due to the fact that neither the curve number (CN) nor the time of concentration (Tc) in these respective watersheds changed for post-project analysis.

Watershed 3 shows a reduction in runoff for all storm events analyzed. The CN did not change for Watershed 3, but the Tc almost doubled for post-project conditions. This Tc increase caused the overall runoff decreases post-project.

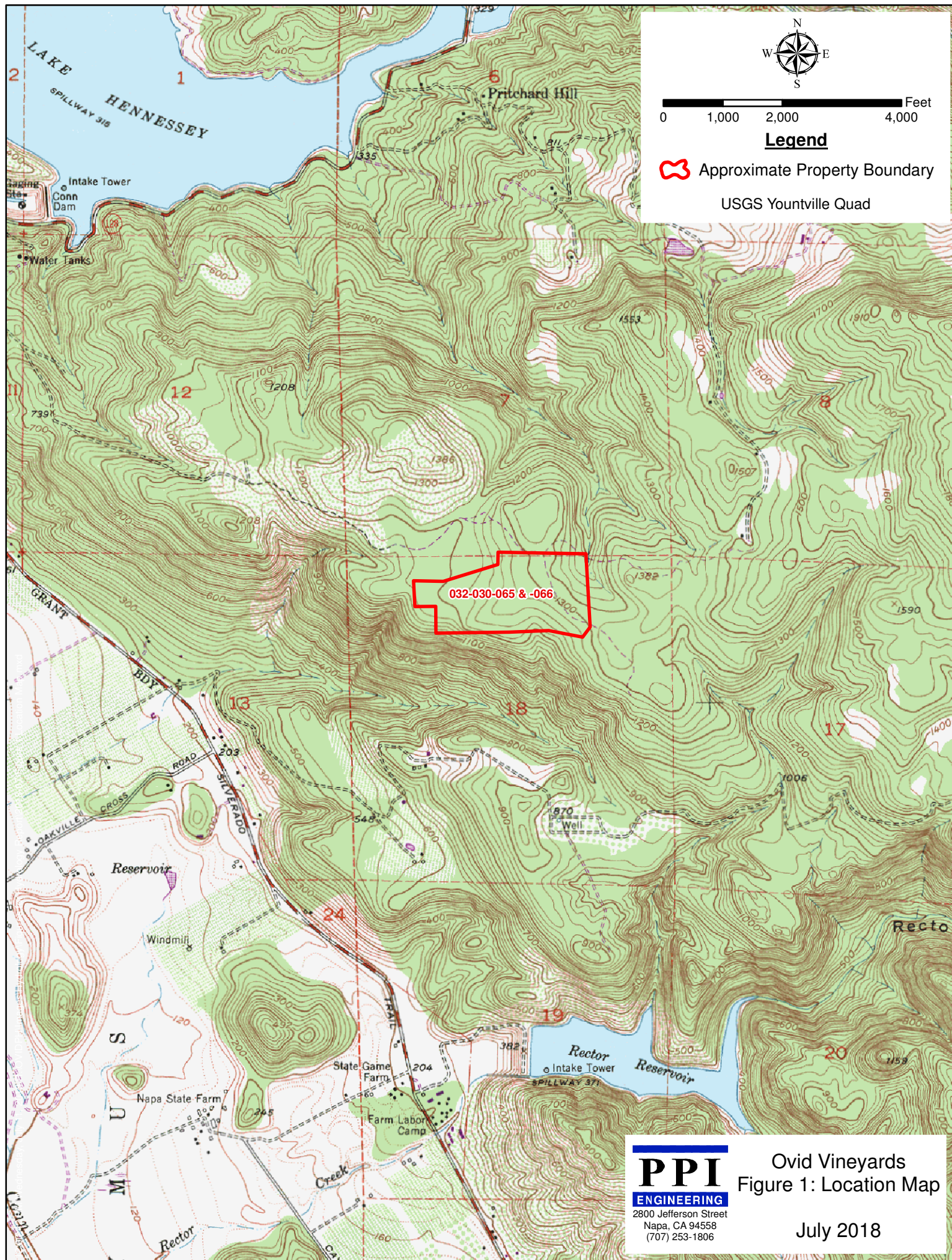
The model shows no runoff changes in the reach connecting Watershed 4 to the Watershed 3 outlet. The runoff in this reach did not change due to the fact that calculated runoff in Watershed 4 did not change from pre- to post-project conditions. Additionally, the analyzed outlet point for both Watersheds 3 & 4 shows a post-project decrease in runoff for all storm events analyzed. These decreases can be attributed to the overall runoff decreases calculated in the individual Watershed 3 analysis.

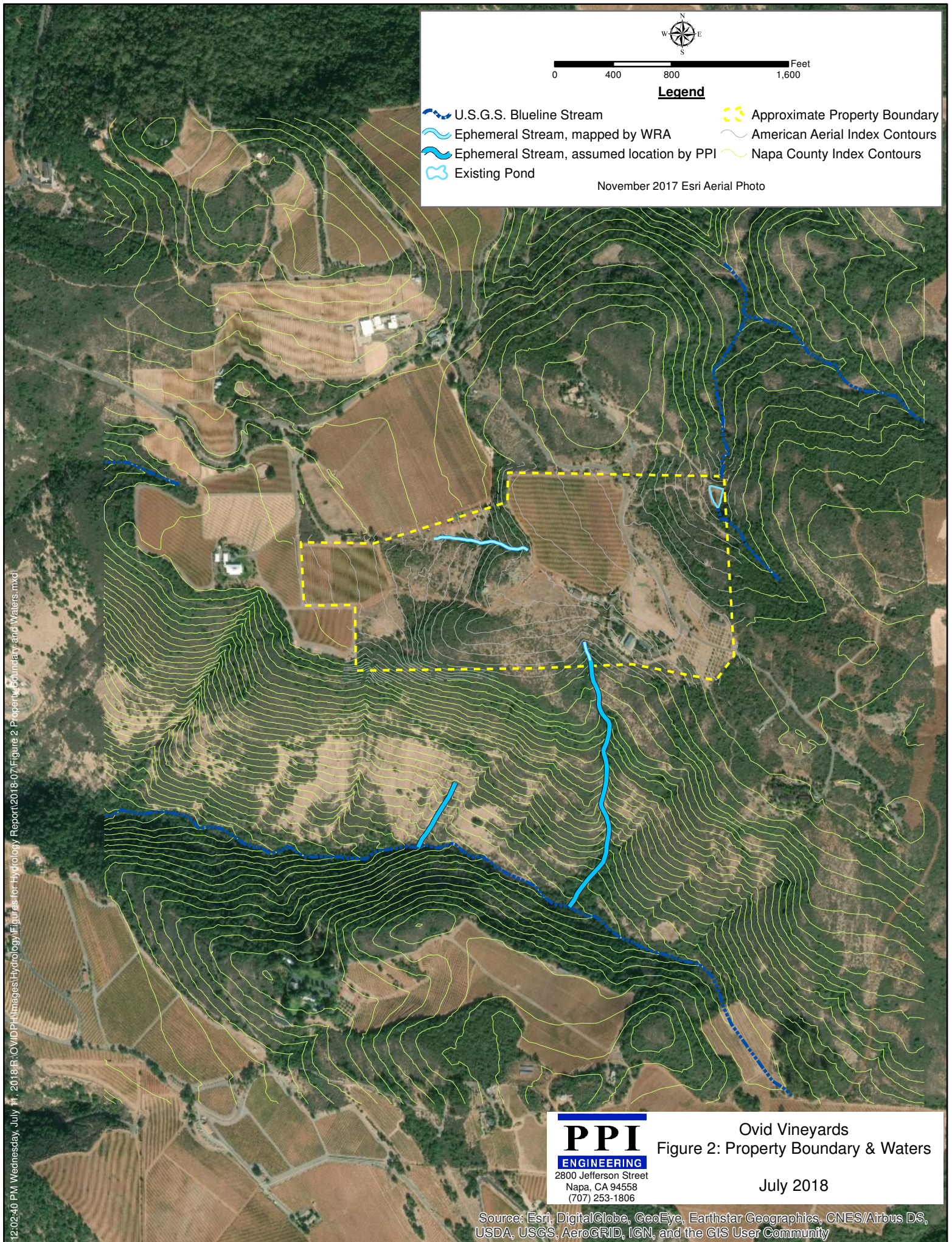
Please see the attached HydroCAD analyses for inputs, details and summaries of the hydrologic modeling. Based on our analysis, there are no predicted net runoff increases and no negative hydrologic impacts are expected as a result of this project. The project as proposed is in compliance with Napa County's General Plan policy requiring no net increase in runoff.

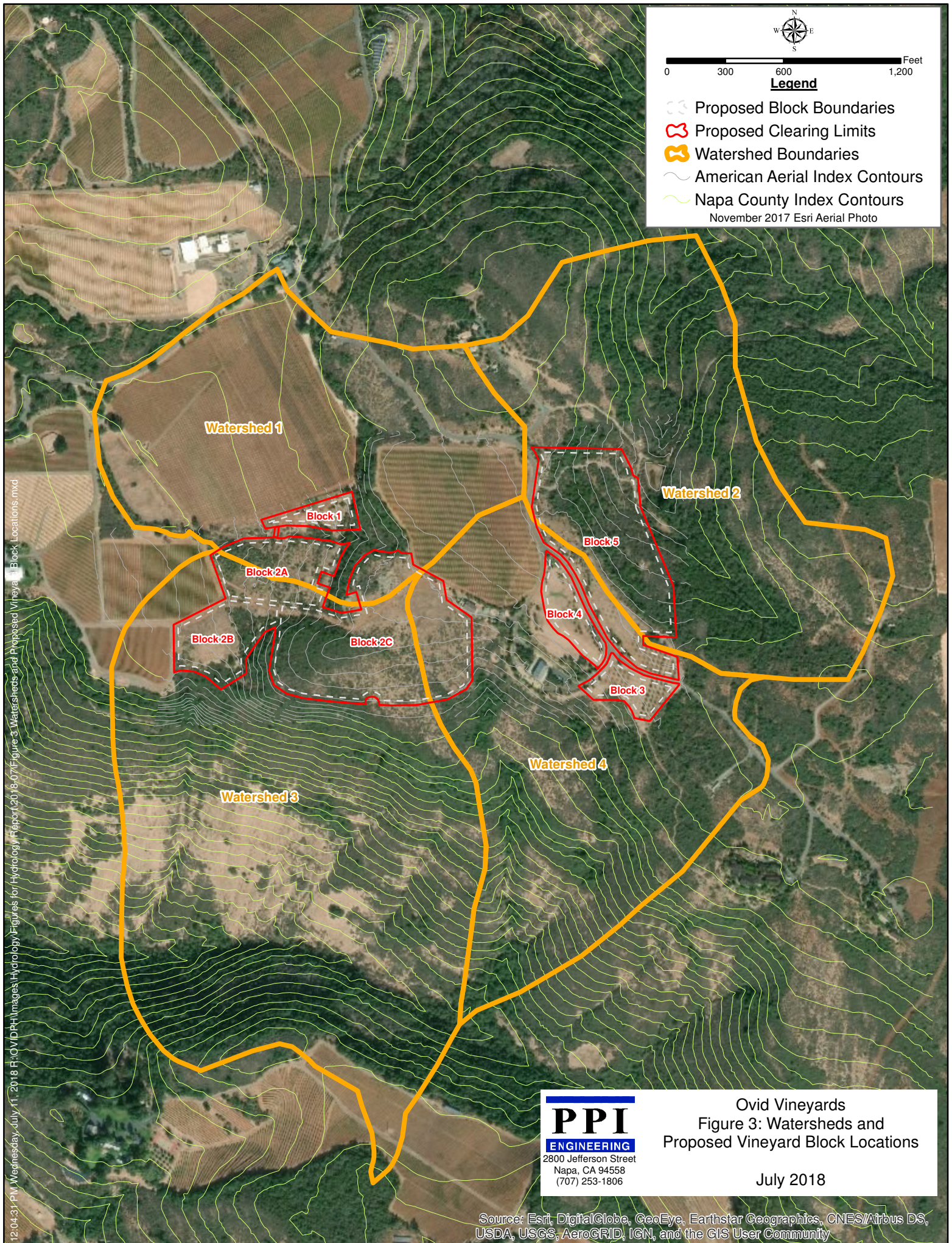


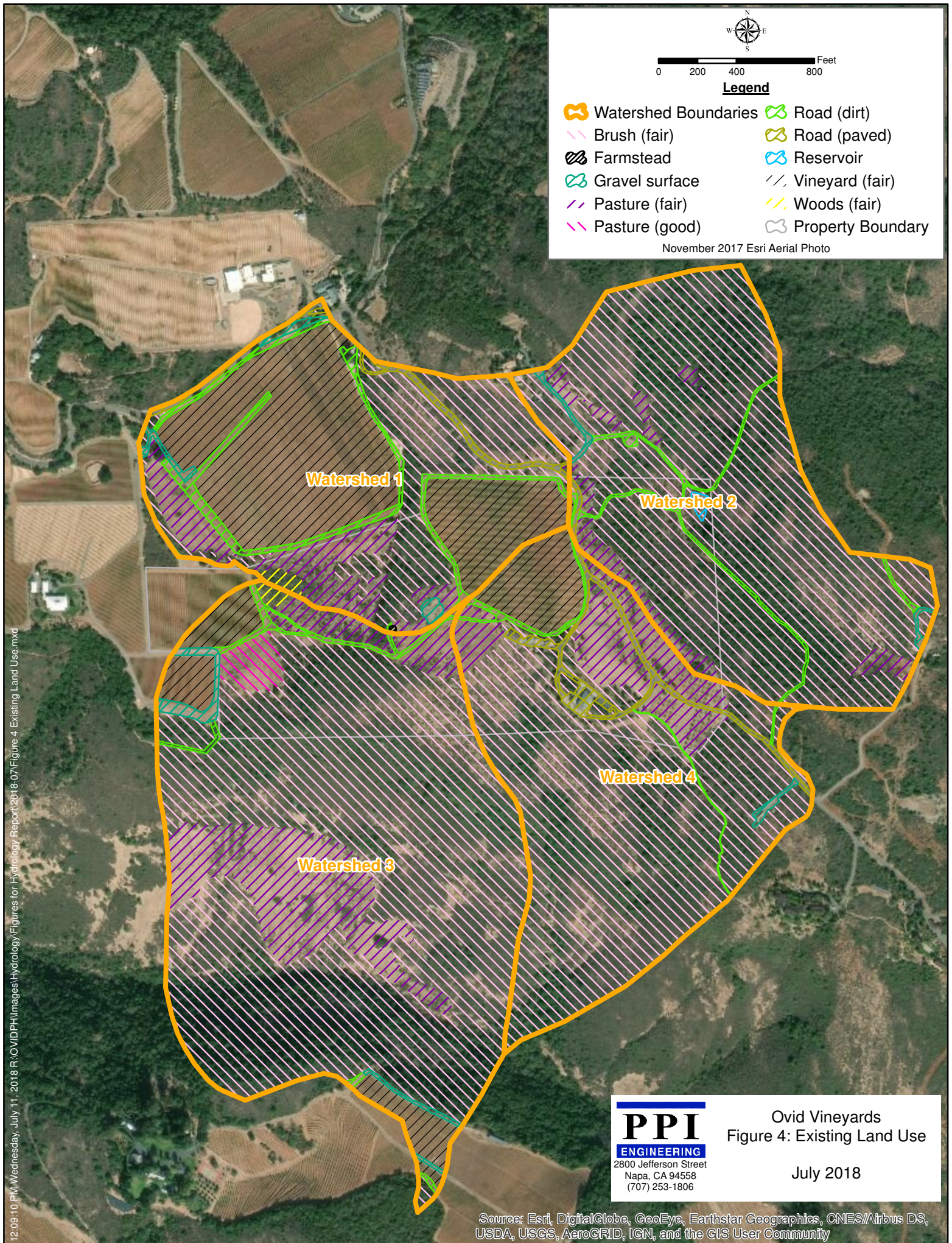
ATTACHMENT A

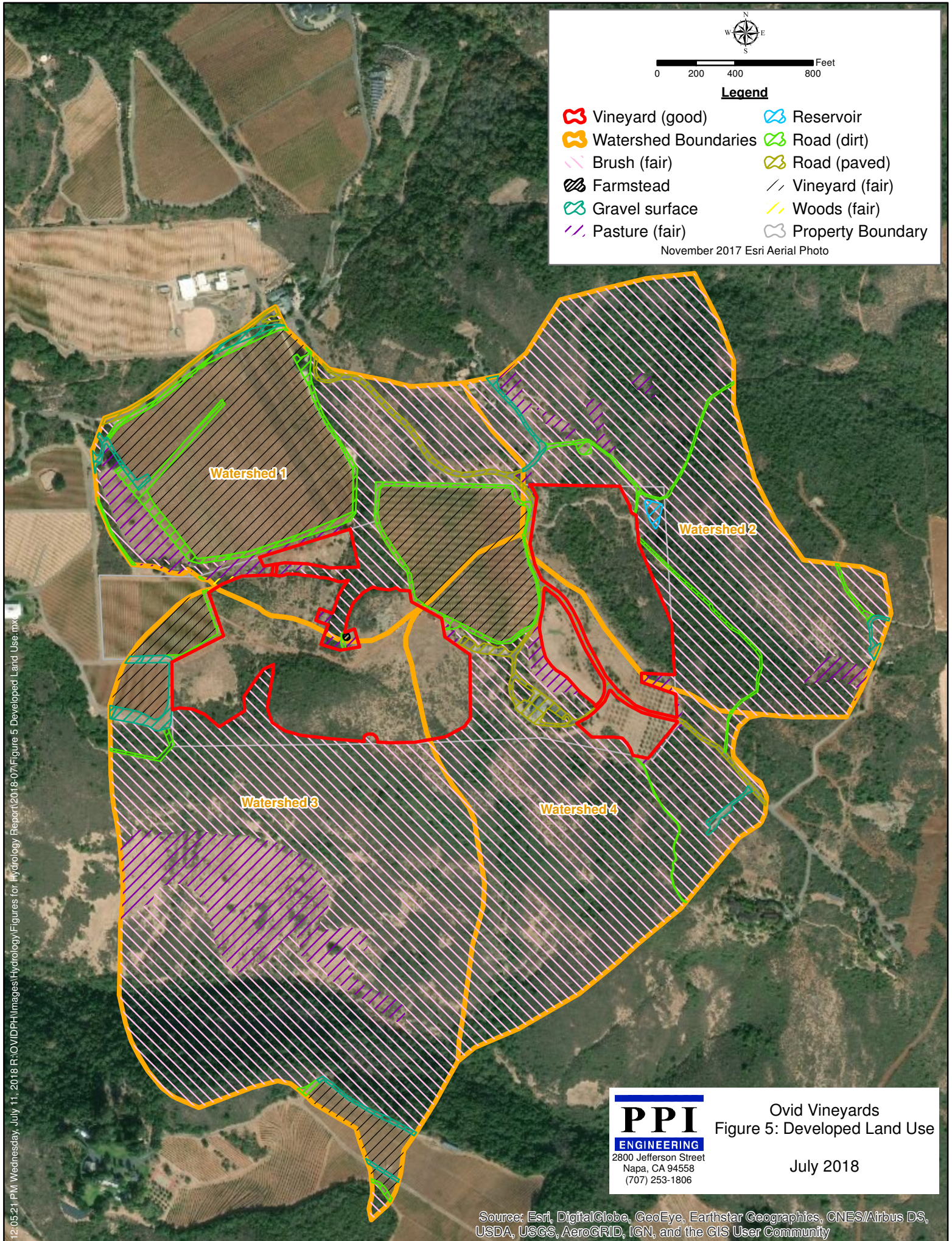
SUPPORTING FIGURES

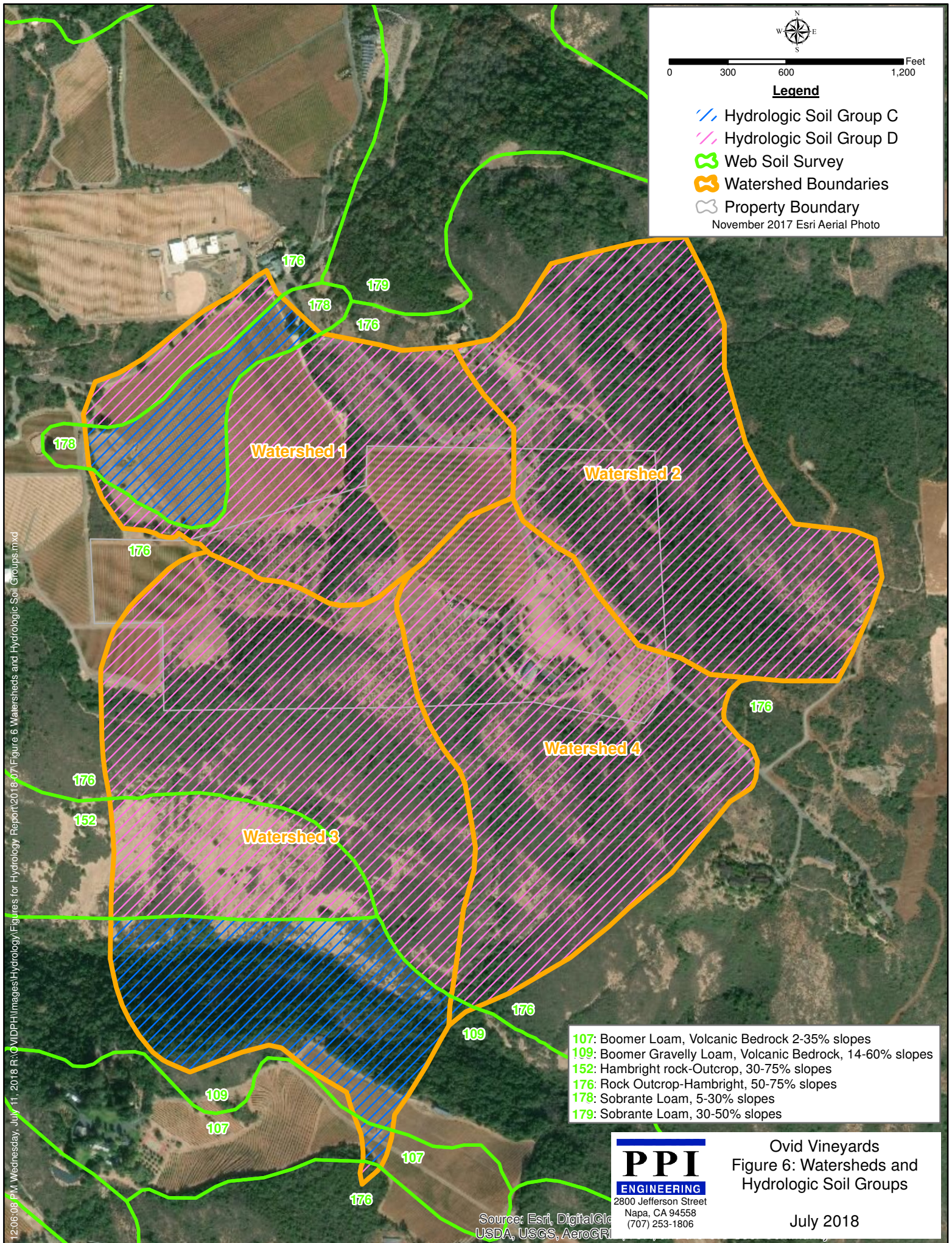












0 300 600 1,200 Feet

Legend

- Hydrologic Soil Group C
 - Hydrologic Soil Group D
 - Web Soil Survey
 - Watershed Boundaries
 - Property Boundary
- November 2017 Esri Aerial Photo

Watershed 1

Watershed 2

Watershed 4

Watershed 3

- 107: Boomer Loam, Volcanic Bedrock 2-35% slopes
- 109: Boomer Gravelly Loam, Volcanic Bedrock, 14-60% slopes
- 152: Hambright rock-Outcrop, 30-75% slopes
- 176: Rock Outcrop-Hambright, 50-75% slopes
- 178: Sobranite Loam, 5-30% slopes
- 179: Sobranite Loam, 30-50% slopes

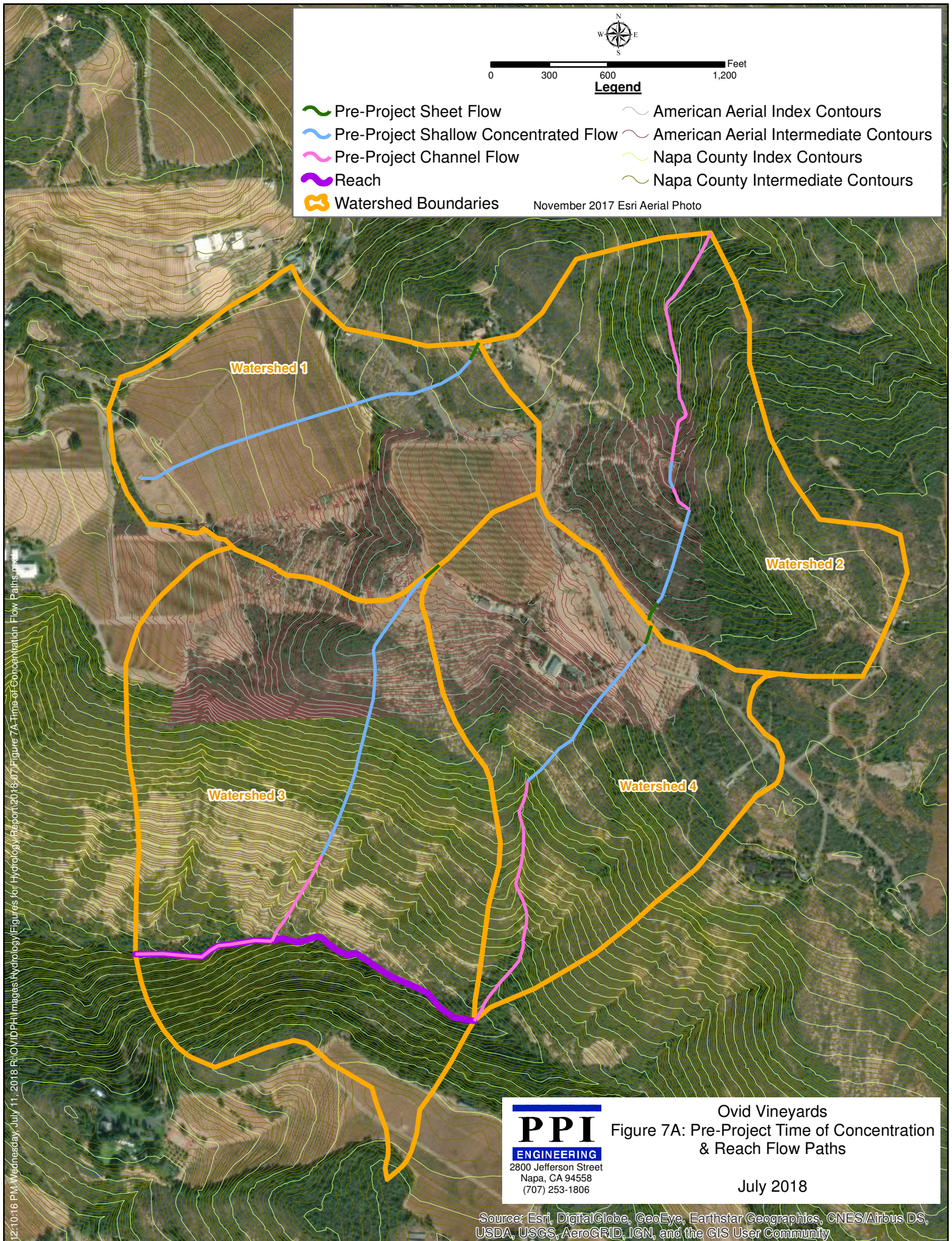
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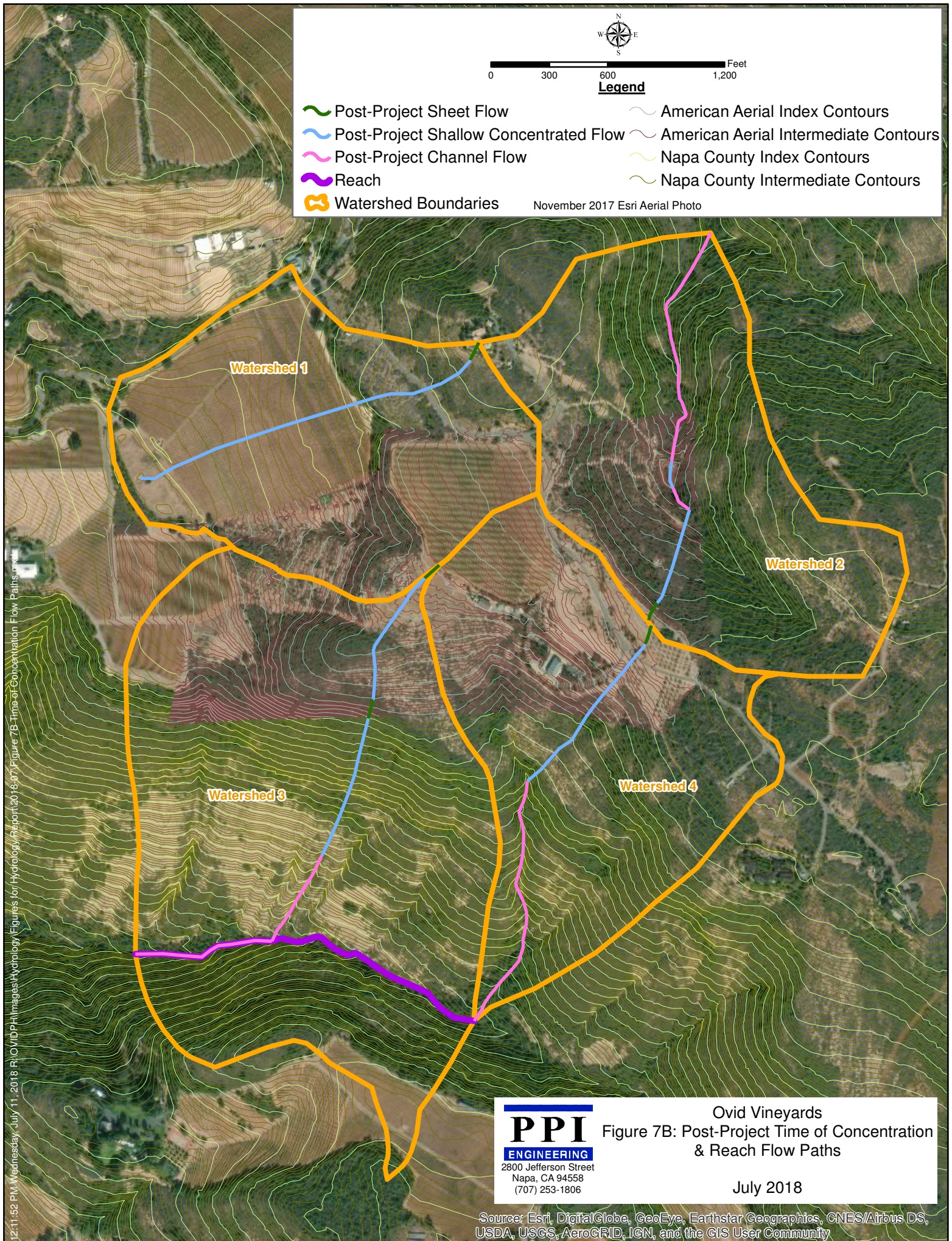
2800 Jefferson Street
Napa, CA 94558
(707) 253-1806

Ovid Vineyards
Figure 6: Watersheds and
Hydrologic Soil Groups

July 2018

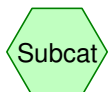
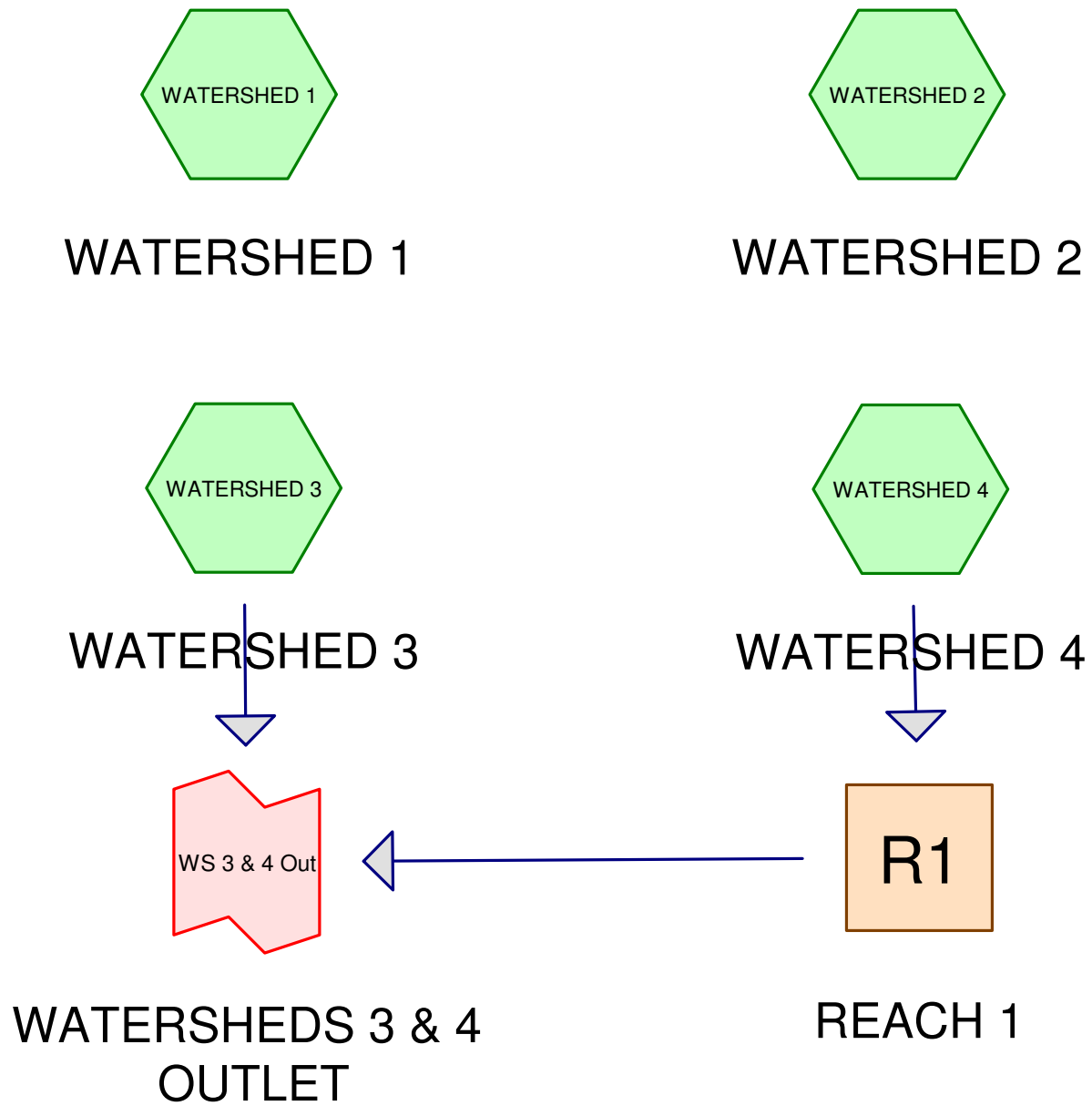
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USDA, USGS, AeroGRID





ATTACHMENT B

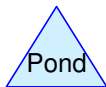
HYDROCAD ANALYSES



Subcat



Reach



Pond



Link

Routing Diagram for Ovid Hydrologic Analysis
Prepared by PPI Engineering., Printed 7/11/2018
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Ovid Pre-Project

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Type IA 24-hr 2-YEAR Rainfall=3.89"

Printed 7/11/2018

Summary for Subcatchment WATERSHED 1: WATERSHED 1

Runoff = 27.25 cfs @ 8.05 hrs, Volume= 9.680 af, Depth= 2.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type IA 24-hr 2-YEAR Rainfall=3.89"

Area (ac)	CN	Description
* 0.000	0	, HSG D
0.318	70	Brush, Fair, HSG C
14.481	77	Brush, Fair, HSG D
1.236	87	Dirt roads, HSG C
2.001	89	Dirt roads, HSG D
0.022	86	Farmsteads, HSG D
0.154	96	Gravel surface, HSG C
0.644	96	Gravel surface, HSG D
1.464	79	Pasture/grassland/range, Fair, HSG C
5.693	84	Pasture/grassland/range, Fair, HSG D
0.044	92	Paved roads w/open ditches, 50% imp, HSG C
1.464	93	Paved roads w/open ditches, 50% imp, HSG D
8.357	79	Vineyard, Fair, HSG C
18.767	84	Vineyard, Fair, HSG D
0.429	79	Woods, Fair, HSG D
55.073	82	Weighted Average
54.319		98.63% Pervious Area
0.754		1.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	66	0.0700	0.13		Sheet Flow, SHEET
					Woods: Light underbrush n= 0.400 P2= 3.89"
6.1	1,863	0.1000	5.09		Shallow Concentrated Flow, SHALLOW
					Unpaved Kv= 16.1 fps
14.6	1,929	Total			

Ovid Pre-Project

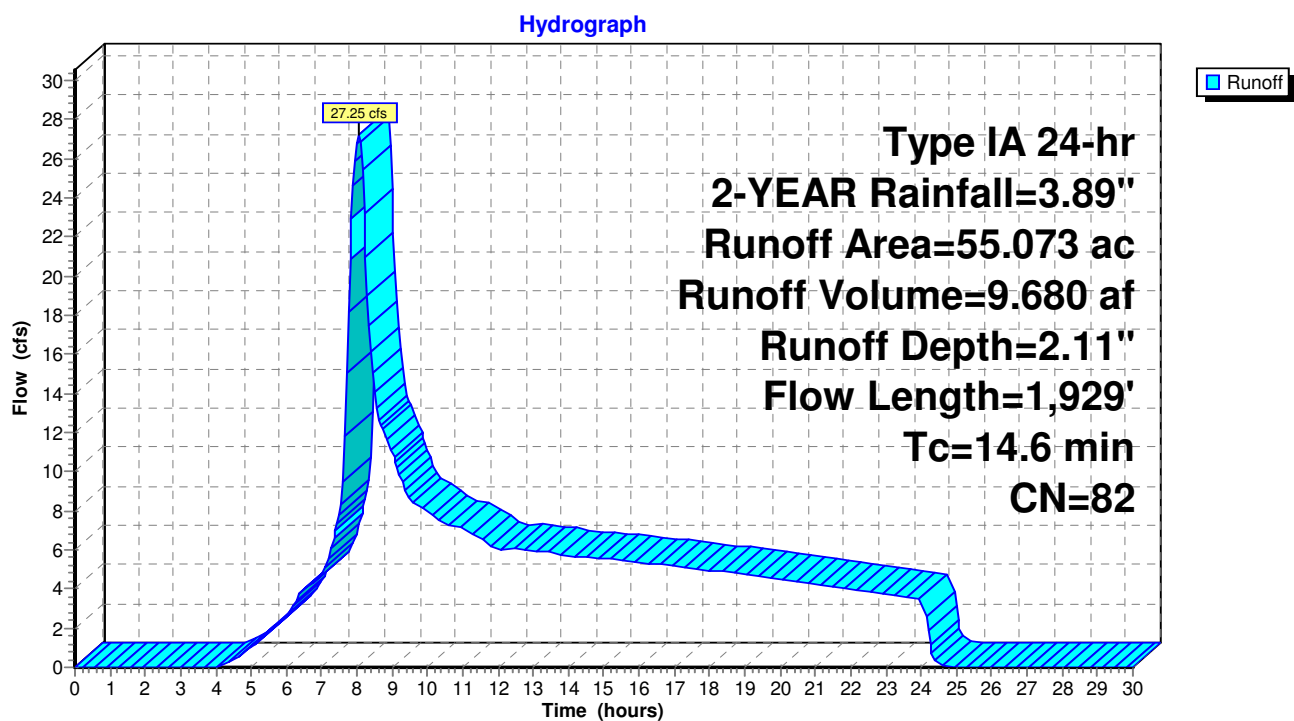
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Type IA 24-hr 2-YEAR Rainfall=3.89"

Printed 7/11/2018

Subcatchment WATERSHED 1: WATERSHED 1



Ovid Pre-Project

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Type IA 24-hr 10-YEAR Rainfall=5.75"

Printed 7/11/2018

Summary for Subcatchment WATERSHED 1: WATERSHED 1

Runoff = 51.37 cfs @ 8.04 hrs, Volume= 17.246 af, Depth= 3.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type IA 24-hr 10-YEAR Rainfall=5.75"

Area (ac)	CN	Description
* 0.000	0	, HSG D
0.318	70	Brush, Fair, HSG C
14.481	77	Brush, Fair, HSG D
1.236	87	Dirt roads, HSG C
2.001	89	Dirt roads, HSG D
0.022	86	Farmsteads, HSG D
0.154	96	Gravel surface, HSG C
0.644	96	Gravel surface, HSG D
1.464	79	Pasture/grassland/range, Fair, HSG C
5.693	84	Pasture/grassland/range, Fair, HSG D
0.044	92	Paved roads w/open ditches, 50% imp, HSG C
1.464	93	Paved roads w/open ditches, 50% imp, HSG D
8.357	79	Vineyard, Fair, HSG C
18.767	84	Vineyard, Fair, HSG D
0.429	79	Woods, Fair, HSG D
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54.319		98.63% Pervious Area
0.754		1.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	66	0.0700	0.13		Sheet Flow, SHEET
					Woods: Light underbrush n= 0.400 P2= 3.89"
6.1	1,863	0.1000	5.09		Shallow Concentrated Flow, SHALLOW
					Unpaved Kv= 16.1 fps
14.6	1,929	Total			

Ovid Pre-Project

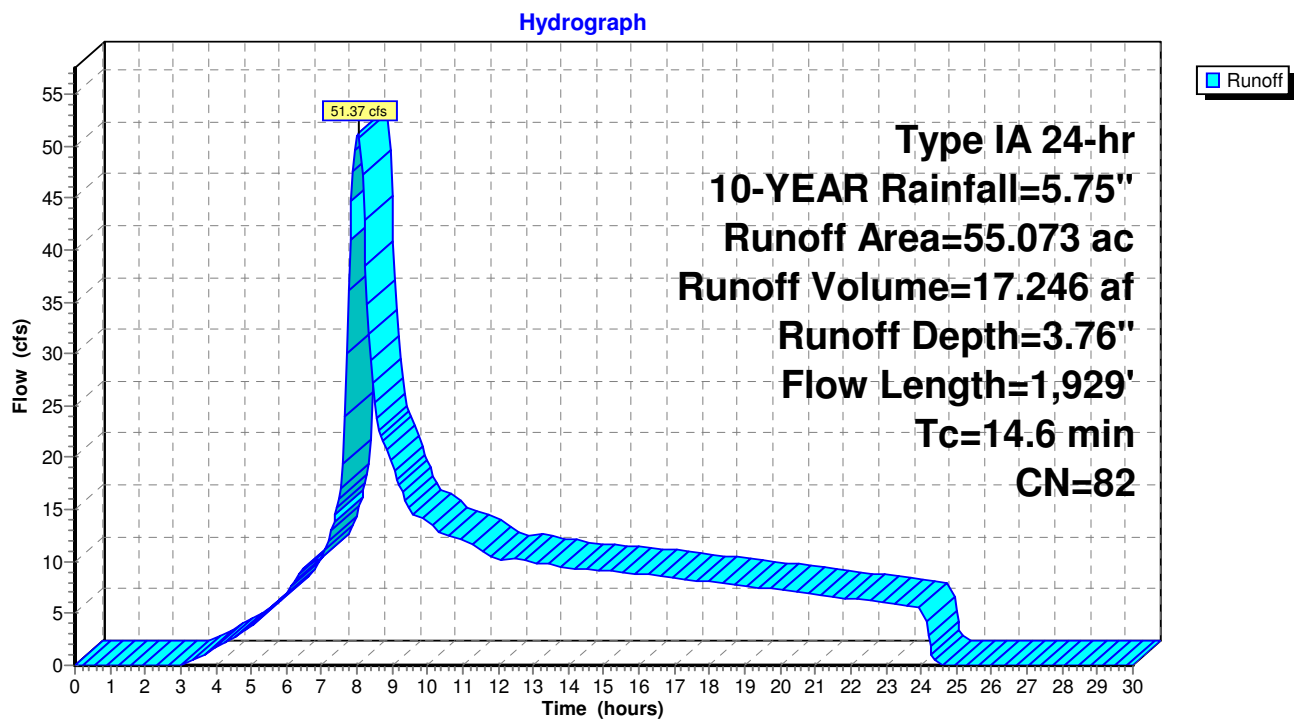
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Type IA 24-hr 10-YEAR Rainfall=5.75"

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Subcatchment WATERSHED 1: WATERSHED 1



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Type IA 24-hr 50-YEAR Rainfall=7.65"

Printed 7/11/2018

Summary for Subcatchment WATERSHED 1: WATERSHED 1

Runoff = 77.08 cfs @ 8.03 hrs, Volume= 25.371 af, Depth= 5.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type IA 24-hr 50-YEAR Rainfall=7.65"

Area (ac)	CN	Description
* 0.000	0	, HSG D
0.318	70	Brush, Fair, HSG C
14.481	77	Brush, Fair, HSG D
1.236	87	Dirt roads, HSG C
2.001	89	Dirt roads, HSG D
0.022	86	Farmsteads, HSG D
0.154	96	Gravel surface, HSG C
0.644	96	Gravel surface, HSG D
1.464	79	Pasture/grassland/range, Fair, HSG C
5.693	84	Pasture/grassland/range, Fair, HSG D
0.044	92	Paved roads w/open ditches, 50% imp, HSG C
1.464	93	Paved roads w/open ditches, 50% imp, HSG D
8.357	79	Vineyard, Fair, HSG C
18.767	84	Vineyard, Fair, HSG D
0.429	79	Woods, Fair, HSG D
55.073	82	Weighted Average
54.319		98.63% Pervious Area
0.754		1.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	66	0.0700	0.13		Sheet Flow, SHEET
					Woods: Light underbrush n= 0.400 P2= 3.89"
6.1	1,863	0.1000	5.09		Shallow Concentrated Flow, SHALLOW
					Unpaved Kv= 16.1 fps
14.6	1,929	Total			

Ovid Pre-Project

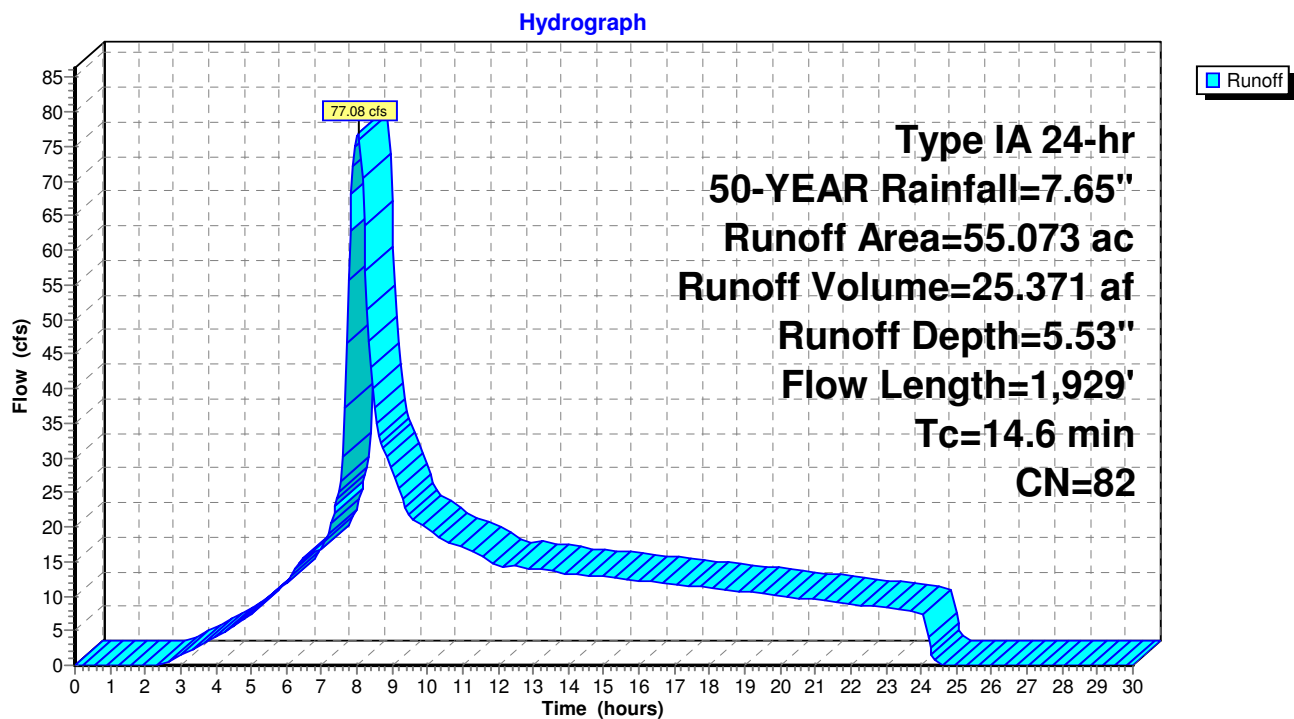
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Type IA 24-hr 50-YEAR Rainfall=7.65"

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Subcatchment WATERSHED 1: WATERSHED 1



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Type IA 24-hr 100-YEAR Rainfall=8.45"

Printed 7/11/2018

Summary for Subcatchment WATERSHED 1: WATERSHED 1

Runoff = 88.01 cfs @ 8.03 hrs, Volume= 28.858 af, Depth= 6.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type IA 24-hr 100-YEAR Rainfall=8.45"

Area (ac)	CN	Description
* 0.000	0	, HSG D
0.318	70	Brush, Fair, HSG C
14.481	77	Brush, Fair, HSG D
1.236	87	Dirt roads, HSG C
2.001	89	Dirt roads, HSG D
0.022	86	Farmsteads, HSG D
0.154	96	Gravel surface, HSG C
0.644	96	Gravel surface, HSG D
1.464	79	Pasture/grassland/range, Fair, HSG C
5.693	84	Pasture/grassland/range, Fair, HSG D
0.044	92	Paved roads w/open ditches, 50% imp, HSG C
1.464	93	Paved roads w/open ditches, 50% imp, HSG D
8.357	79	Vineyard, Fair, HSG C
18.767	84	Vineyard, Fair, HSG D
0.429	79	Woods, Fair, HSG D
55.073	82	Weighted Average
54.319		98.63% Pervious Area
0.754		1.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	66	0.0700	0.13		Sheet Flow, SHEET
					Woods: Light underbrush n= 0.400 P2= 3.89"
6.1	1,863	0.1000	5.09		Shallow Concentrated Flow, SHALLOW
					Unpaved Kv= 16.1 fps
14.6	1,929	Total			

Ovid Pre-Project

Prepared by PPI Engineering.

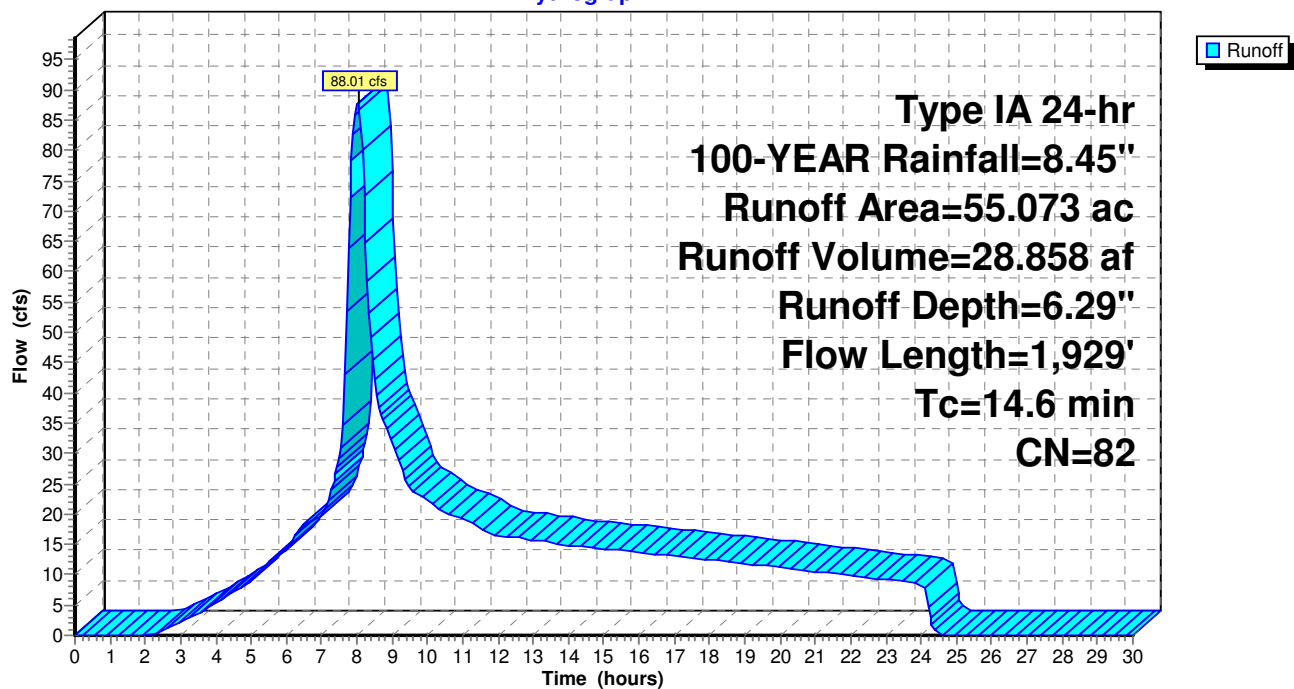
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Type IA 24-hr 100-YEAR Rainfall=8.45"

Printed 7/11/2018

Subcatchment WATERSHED 1: WATERSHED 1

Hydrograph



Ovid Post-Project

Prepared by PPI Engineering.

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Type IA 24-hr 2-YEAR Rainfall=3.89"

Printed 7/11/2018

Summary for Subcatchment WATERSHED 1: WATERSHED 1

Runoff = 27.25 cfs @ 8.05 hrs, Volume= 9.680 af, Depth= 2.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type IA 24-hr 2-YEAR Rainfall=3.89"

Area (ac)	CN	Description
* 0.000	0	, HSG D
0.318	70	Brush, Fair, HSG C
13.242	77	Brush, Fair, HSG D
1.236	87	Dirt roads, HSG C
1.949	89	Dirt roads, HSG D
0.022	86	Farmsteads, HSG D
0.154	96	Gravel surface, HSG C
0.402	96	Gravel surface, HSG D
1.464	79	Pasture/grassland/range, Fair, HSG C
2.191	84	Pasture/grassland/range, Fair, HSG D
0.044	92	Paved roads w/open ditches, 50% imp, HSG C
1.464	93	Paved roads w/open ditches, 50% imp, HSG D
8.357	79	Vineyard, Fair, HSG C
18.767	84	Vineyard, Fair, HSG D
5.375	81	Vineyard, Good, HSG D
0.087	79	Woods, Fair, HSG D
55.073	82	Weighted Average
54.319		98.63% Pervious Area
0.754		1.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	66	0.0700	0.13		Sheet Flow, SHEET
					Woods: Light underbrush n= 0.400 P2= 3.89"
6.1	1,863	0.1000	5.09		Shallow Concentrated Flow, SHALLOW
					Unpaved Kv= 16.1 fps
14.6	1,929	Total			

Ovid Post-Project

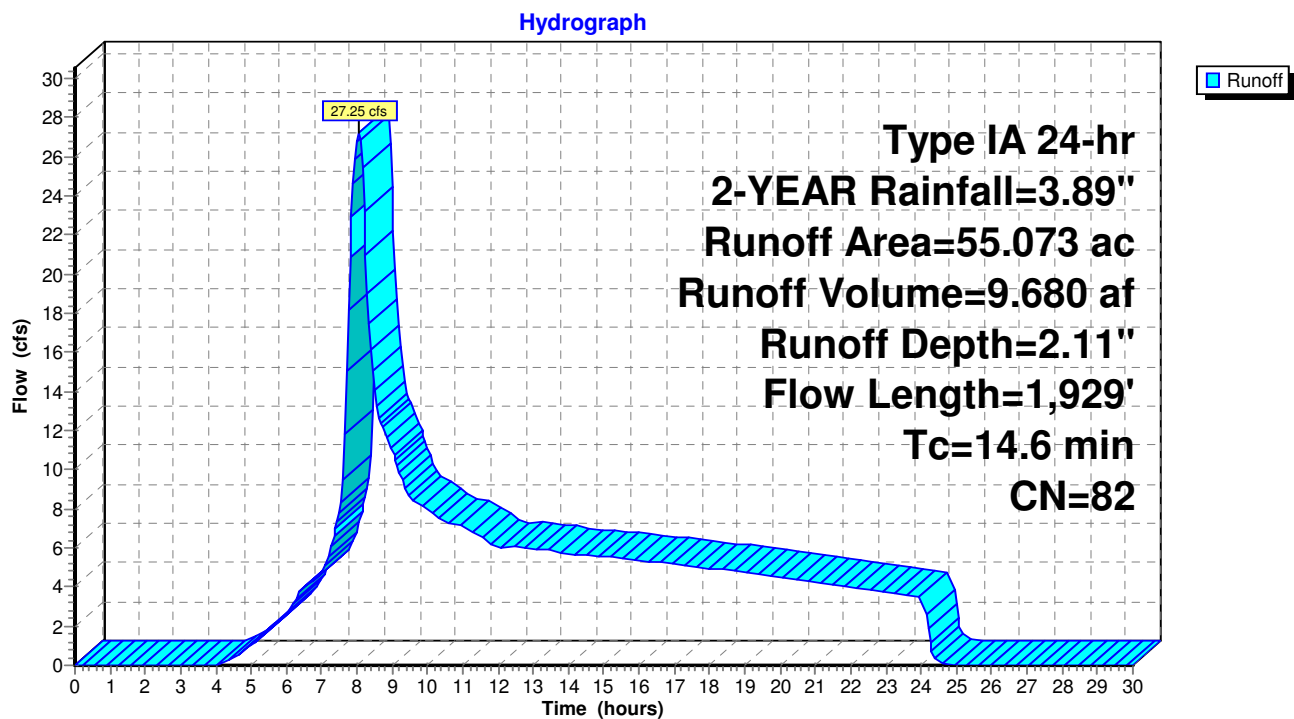
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Type IA 24-hr 2-YEAR Rainfall=3.89"

Printed 7/11/2018

Subcatchment WATERSHED 1: WATERSHED 1



Ovid Post-Project

Prepared by PPI Engineering.

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Type IA 24-hr 10-YEAR Rainfall=5.75"

Printed 7/11/2018

Summary for Subcatchment WATERSHED 1: WATERSHED 1

Runoff = 51.37 cfs @ 8.04 hrs, Volume= 17.246 af, Depth= 3.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type IA 24-hr 10-YEAR Rainfall=5.75"

Area (ac)	CN	Description
* 0.000	0	, HSG D
0.318	70	Brush, Fair, HSG C
13.242	77	Brush, Fair, HSG D
1.236	87	Dirt roads, HSG C
1.949	89	Dirt roads, HSG D
0.022	86	Farmsteads, HSG D
0.154	96	Gravel surface, HSG C
0.402	96	Gravel surface, HSG D
1.464	79	Pasture/grassland/range, Fair, HSG C
2.191	84	Pasture/grassland/range, Fair, HSG D
0.044	92	Paved roads w/open ditches, 50% imp, HSG C
1.464	93	Paved roads w/open ditches, 50% imp, HSG D
8.357	79	Vineyard, Fair, HSG C
18.767	84	Vineyard, Fair, HSG D
5.375	81	Vineyard, Good, HSG D
0.087	79	Woods, Fair, HSG D
55.073	82	Weighted Average
54.319		98.63% Pervious Area
0.754		1.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	66	0.0700	0.13		Sheet Flow, SHEET
					Woods: Light underbrush n= 0.400 P2= 3.89"
6.1	1,863	0.1000	5.09		Shallow Concentrated Flow, SHALLOW
					Unpaved Kv= 16.1 fps
14.6	1,929	Total			

Ovid Post-Project

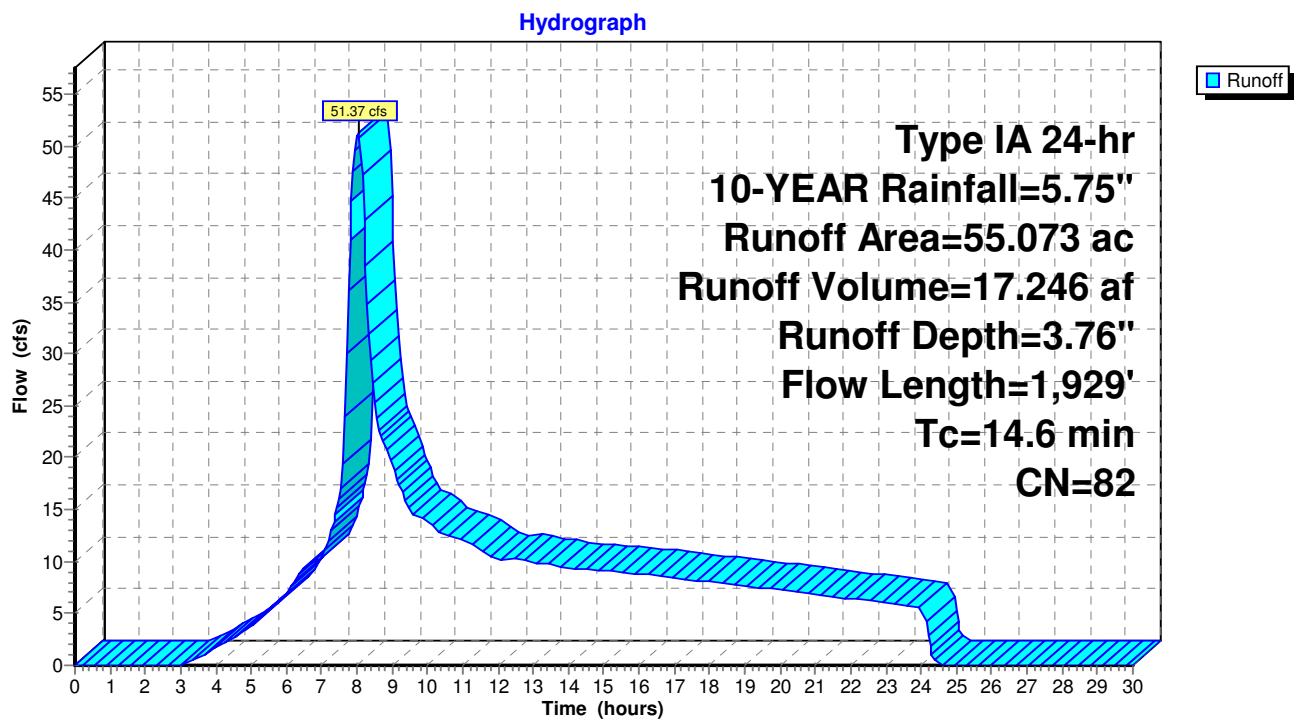
Prepared by PPI Engineering.

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Type IA 24-hr 10-YEAR Rainfall=5.75"

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Subcatchment WATERSHED 1: WATERSHED 1



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Type IA 24-hr 50-YEAR Rainfall=7.65"

Printed 7/11/2018

Summary for Subcatchment WATERSHED 1: WATERSHED 1

Runoff = 77.08 cfs @ 8.03 hrs, Volume= 25.371 af, Depth= 5.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type IA 24-hr 50-YEAR Rainfall=7.65"

Area (ac)	CN	Description
* 0.000	0	, HSG D
0.318	70	Brush, Fair, HSG C
13.242	77	Brush, Fair, HSG D
1.236	87	Dirt roads, HSG C
1.949	89	Dirt roads, HSG D
0.022	86	Farmsteads, HSG D
0.154	96	Gravel surface, HSG C
0.402	96	Gravel surface, HSG D
1.464	79	Pasture/grassland/range, Fair, HSG C
2.191	84	Pasture/grassland/range, Fair, HSG D
0.044	92	Paved roads w/open ditches, 50% imp, HSG C
1.464	93	Paved roads w/open ditches, 50% imp, HSG D
8.357	79	Vineyard, Fair, HSG C
18.767	84	Vineyard, Fair, HSG D
5.375	81	Vineyard, Good, HSG D
0.087	79	Woods, Fair, HSG D
55.073	82	Weighted Average
54.319		98.63% Pervious Area
0.754		1.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	66	0.0700	0.13		Sheet Flow, SHEET
					Woods: Light underbrush n= 0.400 P2= 3.89"
6.1	1,863	0.1000	5.09		Shallow Concentrated Flow, SHALLOW
					Unpaved Kv= 16.1 fps
14.6	1,929	Total			

Ovid Post-Project

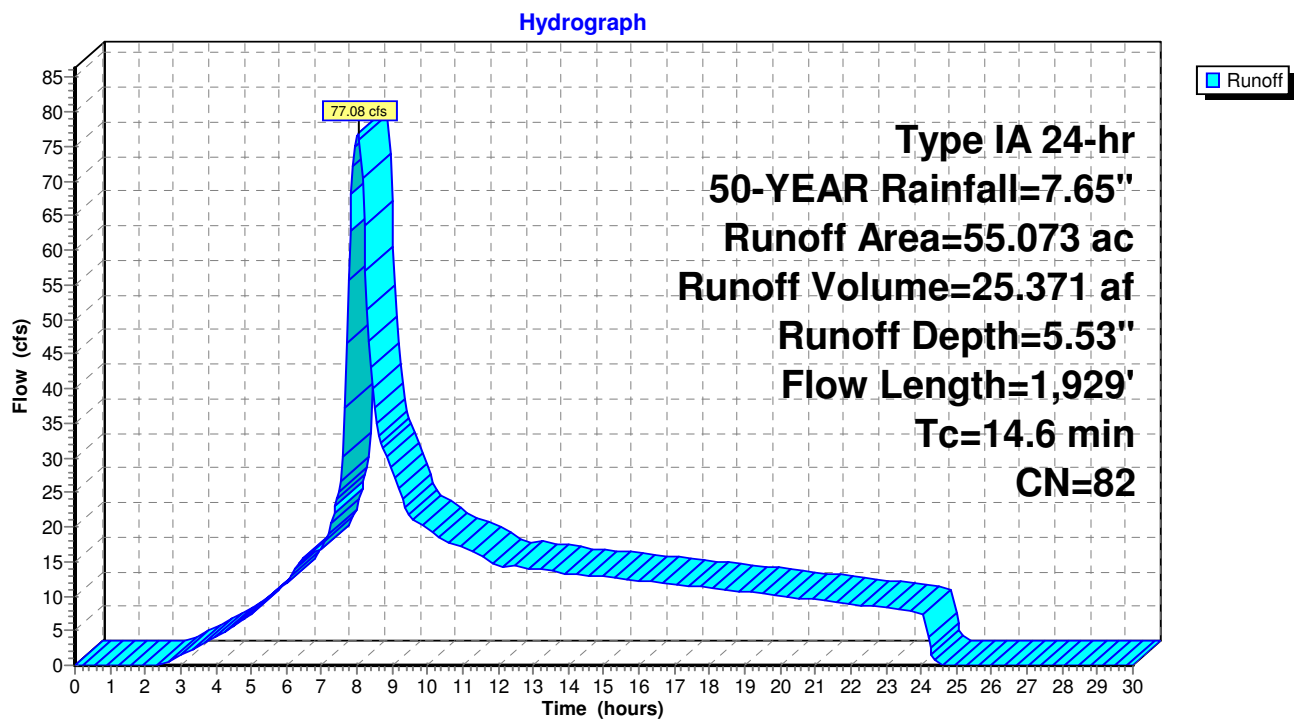
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Type IA 24-hr 50-YEAR Rainfall=7.65"

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Subcatchment WATERSHED 1: WATERSHED 1



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Type IA 24-hr 100-YEAR Rainfall=8.45"

Printed 7/11/2018

Summary for Subcatchment WATERSHED 1: WATERSHED 1

Runoff = 88.01 cfs @ 8.03 hrs, Volume= 28.858 af, Depth= 6.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type IA 24-hr 100-YEAR Rainfall=8.45"

Area (ac)	CN	Description
* 0.000	0	, HSG D
0.318	70	Brush, Fair, HSG C
13.242	77	Brush, Fair, HSG D
1.236	87	Dirt roads, HSG C
1.949	89	Dirt roads, HSG D
0.022	86	Farmsteads, HSG D
0.154	96	Gravel surface, HSG C
0.402	96	Gravel surface, HSG D
1.464	79	Pasture/grassland/range, Fair, HSG C
2.191	84	Pasture/grassland/range, Fair, HSG D
0.044	92	Paved roads w/open ditches, 50% imp, HSG C
1.464	93	Paved roads w/open ditches, 50% imp, HSG D
8.357	79	Vineyard, Fair, HSG C
18.767	84	Vineyard, Fair, HSG D
5.375	81	Vineyard, Good, HSG D
0.087	79	Woods, Fair, HSG D
55.073	82	Weighted Average
54.319		98.63% Pervious Area
0.754		1.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	66	0.0700	0.13		Sheet Flow, SHEET
					Woods: Light underbrush n= 0.400 P2= 3.89"
6.1	1,863	0.1000	5.09		Shallow Concentrated Flow, SHALLOW
					Unpaved Kv= 16.1 fps
14.6	1,929	Total			

Ovid Post-Project

Prepared by PPI Engineering.

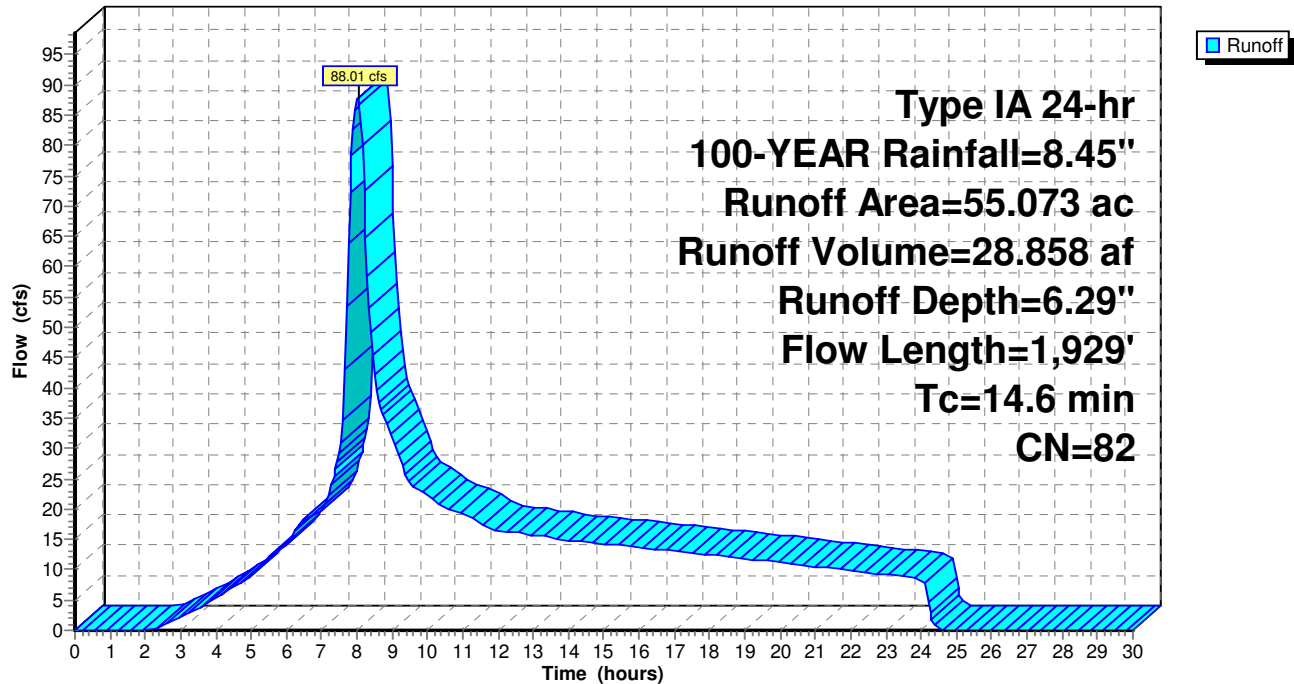
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Type IA 24-hr 100-YEAR Rainfall=8.45"

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Subcatchment WATERSHED 1: WATERSHED 1

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Prepared by PPI Engineering.

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Type IA 24-hr 2-YEAR Rainfall=3.89"

Printed 7/11/2018

Summary for Subcatchment WATERSHED 2: WATERSHED 2

Runoff = 25.24 cfs @ 8.02 hrs, Volume= 9.272 af, Depth= 1.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type IA 24-hr 2-YEAR Rainfall=3.89"

Area (ac)	CN	Description
* 0.000	0	, HSG D
55.311	77	Brush, Fair, HSG D
1.217	89	Dirt roads, HSG D
0.406	96	Gravel surface, HSG D
4.455	84	Pasture/grassland/range, Fair, HSG D
0.180	93	Paved roads w/open ditches, 50% imp, HSG D
0.069	84	Vineyard, Fair, HSG D
0.187	98	Water Surface, HSG D
61.825	78	Weighted Average
61.548		99.55% Pervious Area
0.277		0.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	100	0.1700	0.30		Sheet Flow, SHEET Grass: Dense n= 0.240 P2= 3.89"
1.6	508	0.1100	5.34		Shallow Concentrated Flow, SHALLOW Unpaved Kv= 16.1 fps
0.3	149	0.0700	9.01	121.70	Trap/Vee/Rect Channel Flow, CHANNEL 1 Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00' n= 0.040
2.2	1,277	0.0800	9.64	130.10	Trap/Vee/Rect Channel Flow, CHANNEL 2 Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00' n= 0.040
9.6	2,034	Total			

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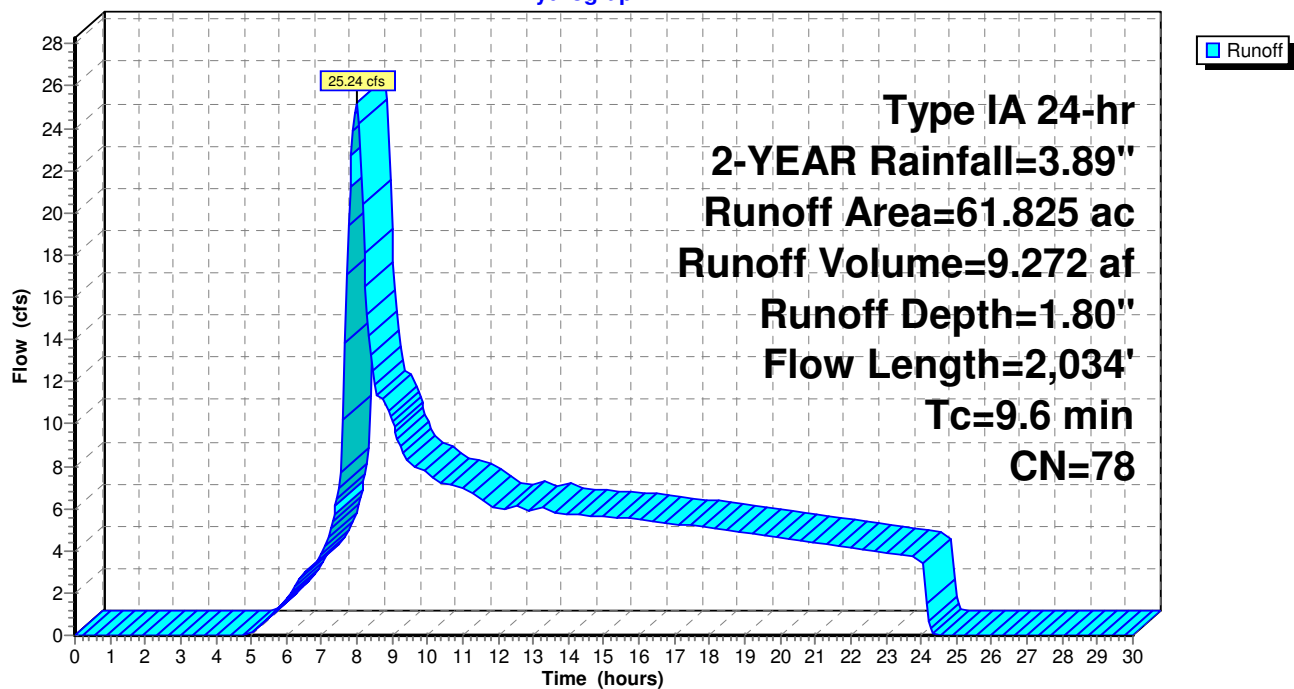
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Type IA 24-hr 2-YEAR Rainfall=3.89"

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Subcatchment WATERSHED 2: WATERSHED 2

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Type IA 24-hr 10-YEAR Rainfall=5.75"

Printed 7/11/2018

Summary for Subcatchment WATERSHED 2: WATERSHED 2

Runoff = 51.23 cfs @ 7.99 hrs, Volume= 17.306 af, Depth= 3.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type IA 24-hr 10-YEAR Rainfall=5.75"

Area (ac)	CN	Description
* 0.000	0	, HSG D
55.311	77	Brush, Fair, HSG D
1.217	89	Dirt roads, HSG D
0.406	96	Gravel surface, HSG D
4.455	84	Pasture/grassland/range, Fair, HSG D
0.180	93	Paved roads w/open ditches, 50% imp, HSG D
0.069	84	Vineyard, Fair, HSG D
0.187	98	Water Surface, HSG D
61.825	78	Weighted Average
61.548		99.55% Pervious Area
0.277		0.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	100	0.1700	0.30		Sheet Flow, SHEET Grass: Dense n= 0.240 P2= 3.89"
1.6	508	0.1100	5.34		Shallow Concentrated Flow, SHALLOW Unpaved Kv= 16.1 fps
0.3	149	0.0700	9.01	121.70	Trap/Vee/Rect Channel Flow, CHANNEL 1 Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00' n= 0.040
2.2	1,277	0.0800	9.64	130.10	Trap/Vee/Rect Channel Flow, CHANNEL 2 Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00' n= 0.040
9.6	2,034	Total			

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Prepared by PPI Engineering.

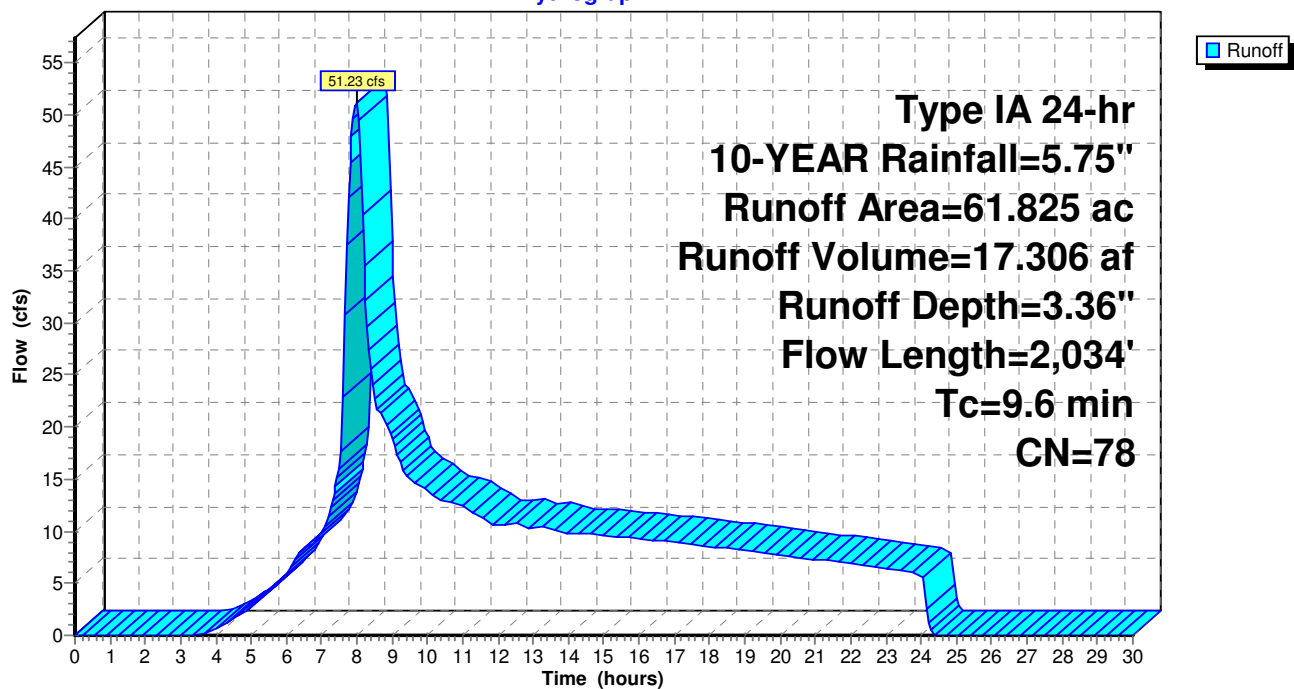
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Type IA 24-hr 10-YEAR Rainfall=5.75"

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Subcatchment WATERSHED 2: WATERSHED 2

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Type IA 24-hr 50-YEAR Rainfall=7.65"

Printed 7/11/2018

Summary for Subcatchment WATERSHED 2: WATERSHED 2

Runoff = 79.85 cfs @ 7.98 hrs, Volume= 26.113 af, Depth= 5.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type IA 24-hr 50-YEAR Rainfall=7.65"

Area (ac)	CN	Description
* 0.000	0	, HSG D
55.311	77	Brush, Fair, HSG D
1.217	89	Dirt roads, HSG D
0.406	96	Gravel surface, HSG D
4.455	84	Pasture/grassland/range, Fair, HSG D
0.180	93	Paved roads w/open ditches, 50% imp, HSG D
0.069	84	Vineyard, Fair, HSG D
0.187	98	Water Surface, HSG D
61.825	78	Weighted Average
61.548		99.55% Pervious Area
0.277		0.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	100	0.1700	0.30		Sheet Flow, SHEET Grass: Dense n= 0.240 P2= 3.89"
1.6	508	0.1100	5.34		Shallow Concentrated Flow, SHALLOW Unpaved Kv= 16.1 fps
0.3	149	0.0700	9.01	121.70	Trap/Vee/Rect Channel Flow, CHANNEL 1 Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00' n= 0.040
2.2	1,277	0.0800	9.64	130.10	Trap/Vee/Rect Channel Flow, CHANNEL 2 Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00' n= 0.040
9.6	2,034	Total			

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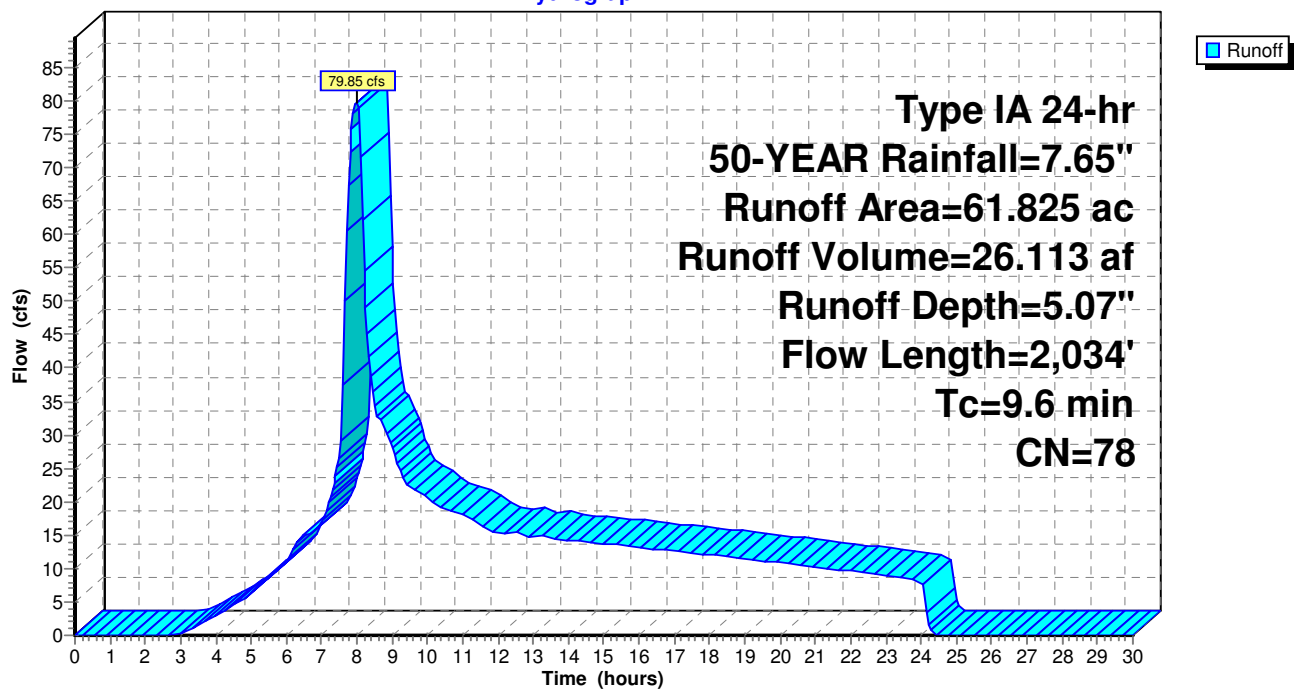
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Type IA 24-hr 50-YEAR Rainfall=7.65"

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Subcatchment WATERSHED 2: WATERSHED 2

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Type IA 24-hr 100-YEAR Rainfall=8.45"

Printed 7/11/2018

Summary for Subcatchment WATERSHED 2: WATERSHED 2

Runoff = 92.18 cfs @ 7.98 hrs, Volume= 29.925 af, Depth= 5.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type IA 24-hr 100-YEAR Rainfall=8.45"

Area (ac)	CN	Description
* 0.000	0	, HSG D
55.311	77	Brush, Fair, HSG D
1.217	89	Dirt roads, HSG D
0.406	96	Gravel surface, HSG D
4.455	84	Pasture/grassland/range, Fair, HSG D
0.180	93	Paved roads w/open ditches, 50% imp, HSG D
0.069	84	Vineyard, Fair, HSG D
0.187	98	Water Surface, HSG D
61.825	78	Weighted Average
61.548		99.55% Pervious Area
0.277		0.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	100	0.1700	0.30		Sheet Flow, SHEET Grass: Dense n= 0.240 P2= 3.89"
1.6	508	0.1100	5.34		Shallow Concentrated Flow, SHALLOW Unpaved Kv= 16.1 fps
0.3	149	0.0700	9.01	121.70	Trap/Vee/Rect Channel Flow, CHANNEL 1 Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00' n= 0.040
2.2	1,277	0.0800	9.64	130.10	Trap/Vee/Rect Channel Flow, CHANNEL 2 Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00' n= 0.040
9.6	2,034	Total			

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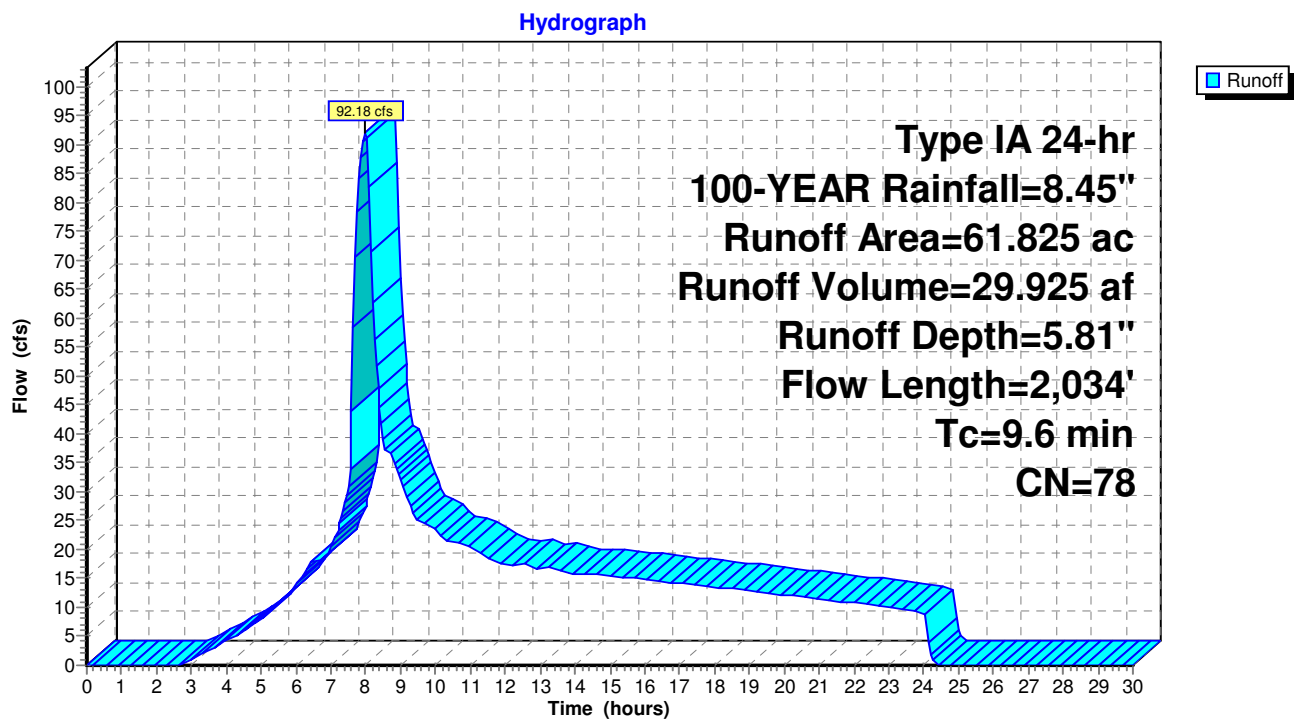
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Type IA 24-hr 100-YEAR Rainfall=8.45"

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Subcatchment WATERSHED 2: WATERSHED 2



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Type IA 24-hr 2-YEAR Rainfall=3.89"

Printed 7/11/2018

Summary for Subcatchment WATERSHED 2: WATERSHED 2

Runoff = 25.24 cfs @ 8.02 hrs, Volume= 9.272 af, Depth= 1.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type IA 24-hr 2-YEAR Rainfall=3.89"

Area (ac)	CN	Description
* 0.000	0	, HSG D
48.107	77	Brush, Fair, HSG D
1.013	89	Dirt roads, HSG D
0.406	96	Gravel surface, HSG D
2.515	84	Pasture/grassland/range, Fair, HSG D
0.177	93	Paved roads w/open ditches, 50% imp, HSG D
0.069	84	Vineyard, Fair, HSG D
9.352	81	Vineyard, Good, HSG D
0.187	98	Water Surface, HSG D
61.825	78	Weighted Average
61.550		99.55% Pervious Area
0.275		0.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	100	0.1700	0.30		Sheet Flow, SHEET Grass: Dense n= 0.240 P2= 3.89"
1.6	508	0.1100	5.34		Shallow Concentrated Flow, SHALLOW Unpaved Kv= 16.1 fps
0.3	149	0.0700	9.01	121.70	Trap/Vee/Rect Channel Flow, CHANNEL 1 Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00' n= 0.040
2.2	1,277	0.0800	9.80	110.27	Trap/Vee/Rect Channel Flow, CHANNEL 2 Bot.W=3.00' D=1.50' Z= 3.0 '/' Top.W=12.00' n= 0.040
9.6	2,034	Total			

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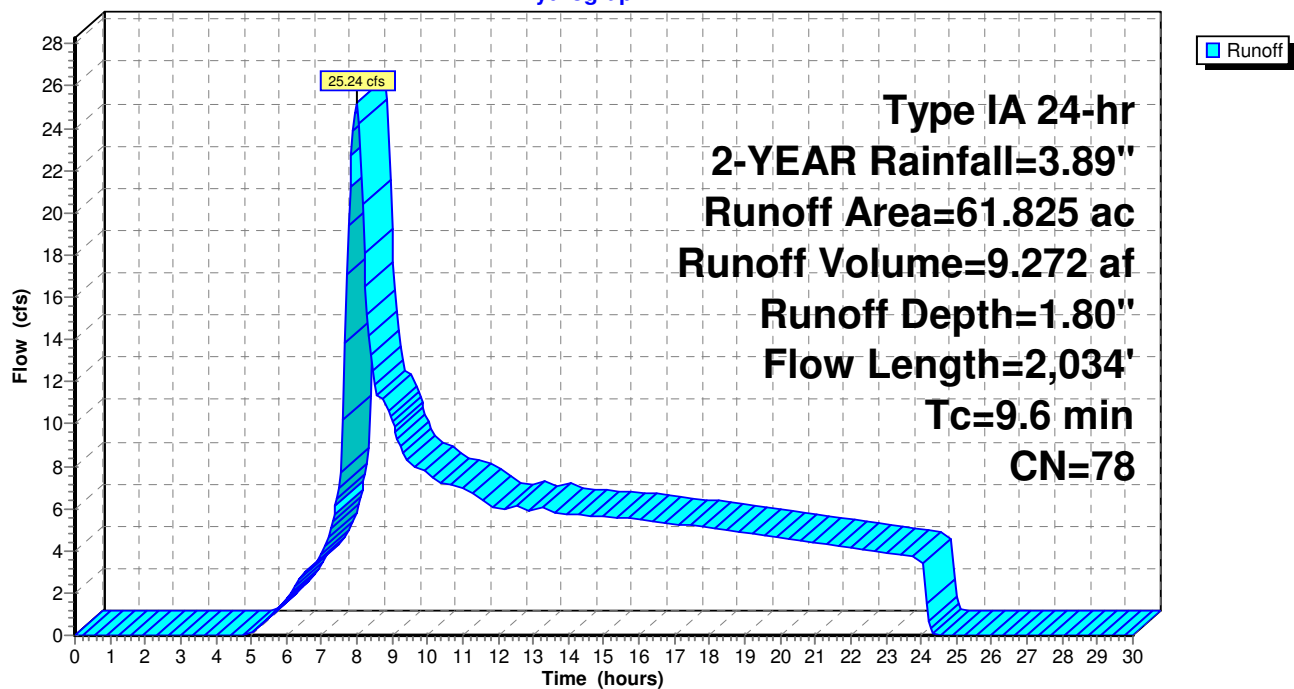
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Type IA 24-hr 2-YEAR Rainfall=3.89"

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Subcatchment WATERSHED 2: WATERSHED 2

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Type IA 24-hr 10-YEAR Rainfall=5.75"

Printed 7/11/2018

Summary for Subcatchment WATERSHED 2: WATERSHED 2

Runoff = 51.23 cfs @ 7.99 hrs, Volume= 17.306 af, Depth= 3.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type IA 24-hr 10-YEAR Rainfall=5.75"

Area (ac)	CN	Description
* 0.000	0	, HSG D
48.107	77	Brush, Fair, HSG D
1.013	89	Dirt roads, HSG D
0.406	96	Gravel surface, HSG D
2.515	84	Pasture/grassland/range, Fair, HSG D
0.177	93	Paved roads w/open ditches, 50% imp, HSG D
0.069	84	Vineyard, Fair, HSG D
9.352	81	Vineyard, Good, HSG D
0.187	98	Water Surface, HSG D
61.825	78	Weighted Average
61.550		99.55% Pervious Area
0.275		0.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	100	0.1700	0.30		Sheet Flow, SHEET Grass: Dense n= 0.240 P2= 3.89"
1.6	508	0.1100	5.34		Shallow Concentrated Flow, SHALLOW Unpaved Kv= 16.1 fps
0.3	149	0.0700	9.01	121.70	Trap/Vee/Rect Channel Flow, CHANNEL 1 Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00' n= 0.040
2.2	1,277	0.0800	9.80	110.27	Trap/Vee/Rect Channel Flow, CHANNEL 2 Bot.W=3.00' D=1.50' Z= 3.0 '/' Top.W=12.00' n= 0.040
9.6	2,034	Total			

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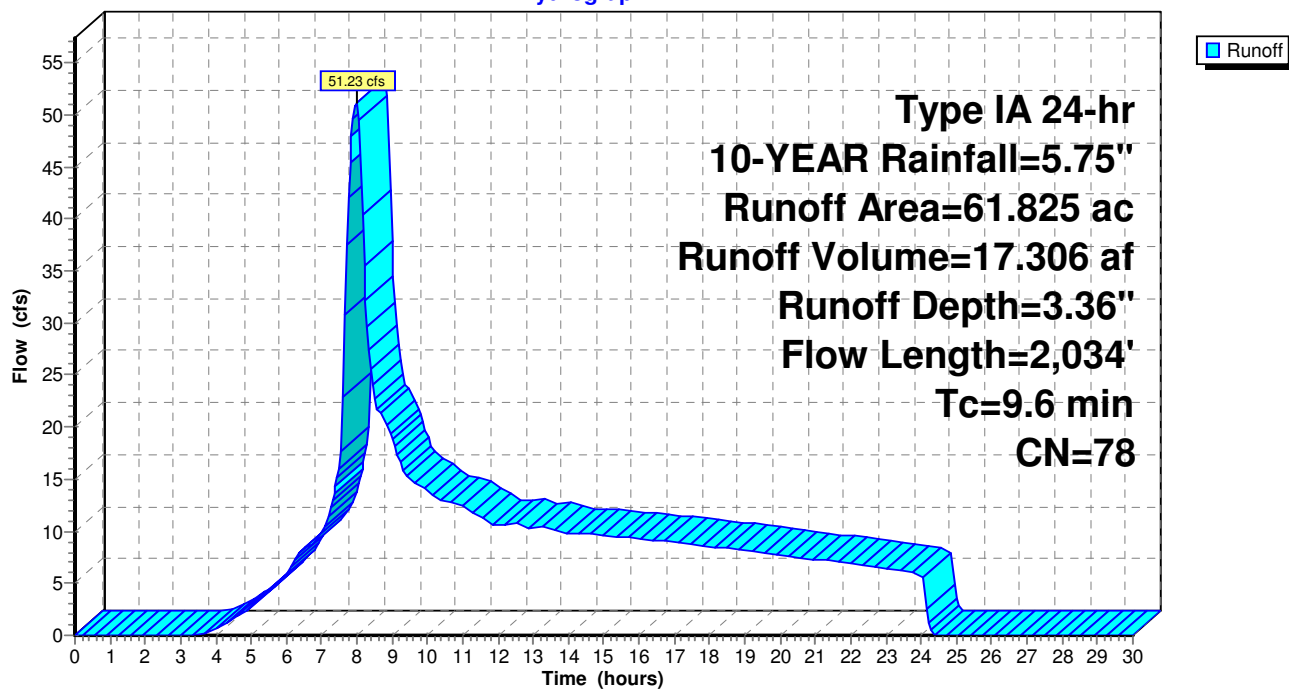
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Type IA 24-hr 10-YEAR Rainfall=5.75"

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Subcatchment WATERSHED 2: WATERSHED 2

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Type IA 24-hr 50-YEAR Rainfall=7.65"

Printed 7/11/2018

Summary for Subcatchment WATERSHED 2: WATERSHED 2

Runoff = 79.85 cfs @ 7.98 hrs, Volume= 26.113 af, Depth= 5.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type IA 24-hr 50-YEAR Rainfall=7.65"

Area (ac)	CN	Description
* 0.000	0	, HSG D
48.107	77	Brush, Fair, HSG D
1.013	89	Dirt roads, HSG D
0.406	96	Gravel surface, HSG D
2.515	84	Pasture/grassland/range, Fair, HSG D
0.177	93	Paved roads w/open ditches, 50% imp, HSG D
0.069	84	Vineyard, Fair, HSG D
9.352	81	Vineyard, Good, HSG D
0.187	98	Water Surface, HSG D
61.825	78	Weighted Average
61.550		99.55% Pervious Area
0.275		0.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	100	0.1700	0.30		Sheet Flow, SHEET Grass: Dense n= 0.240 P2= 3.89"
1.6	508	0.1100	5.34		Shallow Concentrated Flow, SHALLOW Unpaved Kv= 16.1 fps
0.3	149	0.0700	9.01	121.70	Trap/Vee/Rect Channel Flow, CHANNEL 1 Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00' n= 0.040
2.2	1,277	0.0800	9.80	110.27	Trap/Vee/Rect Channel Flow, CHANNEL 2 Bot.W=3.00' D=1.50' Z= 3.0 '/' Top.W=12.00' n= 0.040
9.6	2,034	Total			

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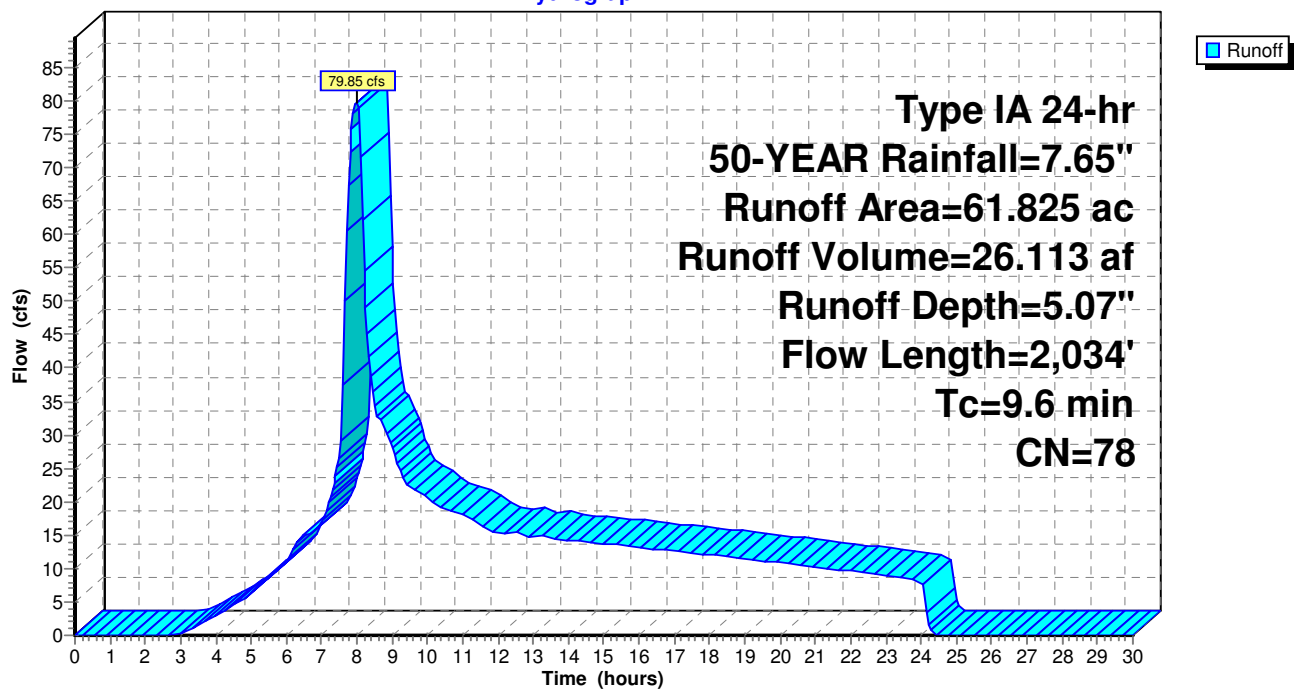
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Type IA 24-hr 50-YEAR Rainfall=7.65"

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Subcatchment WATERSHED 2: WATERSHED 2

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Type IA 24-hr 100-YEAR Rainfall=8.45"

Printed 7/11/2018

Summary for Subcatchment WATERSHED 2: WATERSHED 2

Runoff = 92.18 cfs @ 7.98 hrs, Volume= 29.925 af, Depth= 5.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type IA 24-hr 100-YEAR Rainfall=8.45"

Area (ac)	CN	Description
* 0.000	0	, HSG D
48.107	77	Brush, Fair, HSG D
1.013	89	Dirt roads, HSG D
0.406	96	Gravel surface, HSG D
2.515	84	Pasture/grassland/range, Fair, HSG D
0.177	93	Paved roads w/open ditches, 50% imp, HSG D
0.069	84	Vineyard, Fair, HSG D
9.352	81	Vineyard, Good, HSG D
0.187	98	Water Surface, HSG D
61.825	78	Weighted Average
61.550		99.55% Pervious Area
0.275		0.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	100	0.1700	0.30		Sheet Flow, SHEET Grass: Dense n= 0.240 P2= 3.89"
1.6	508	0.1100	5.34		Shallow Concentrated Flow, SHALLOW Unpaved Kv= 16.1 fps
0.3	149	0.0700	9.01	121.70	Trap/Vee/Rect Channel Flow, CHANNEL 1 Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00' n= 0.040
2.2	1,277	0.0800	9.80	110.27	Trap/Vee/Rect Channel Flow, CHANNEL 2 Bot.W=3.00' D=1.50' Z= 3.0 '/' Top.W=12.00' n= 0.040
9.6	2,034	Total			

Ovid Post-Project

Prepared by PPI Engineering.

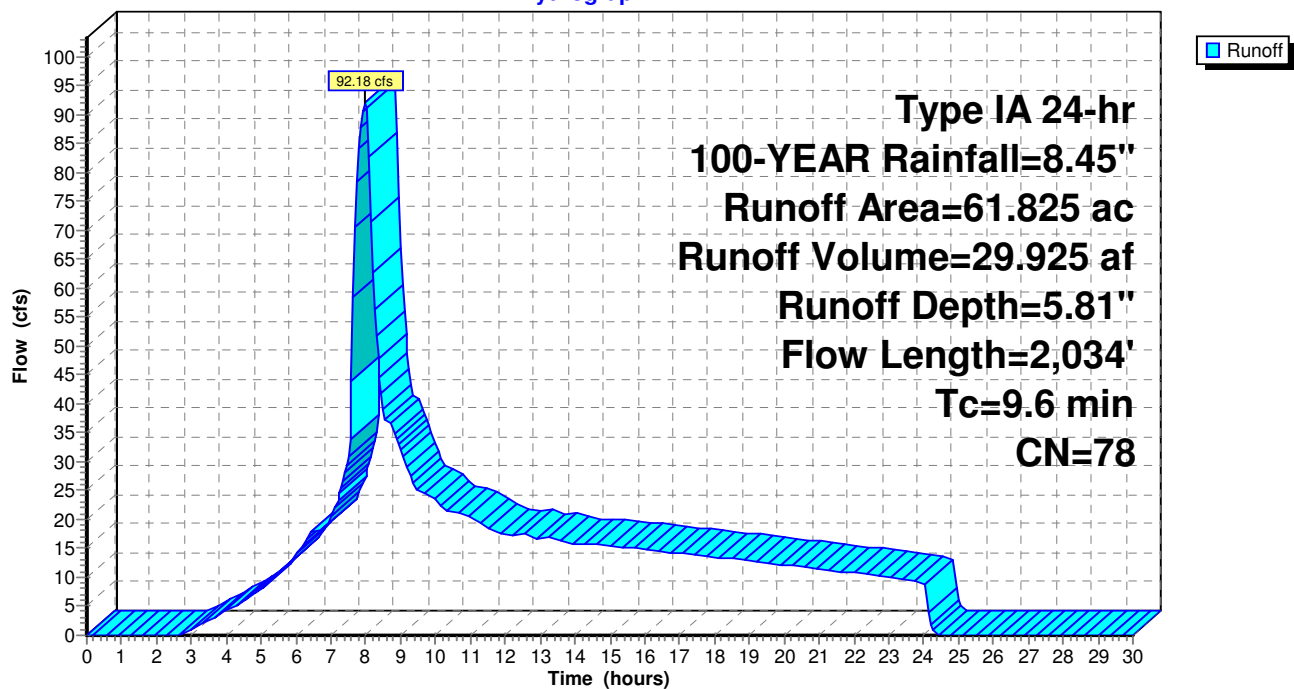
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Type IA 24-hr 100-YEAR Rainfall=8.45"

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Subcatchment WATERSHED 2: WATERSHED 2

Hydrograph



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Prepared by PPI Engineering.

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Type IA 24-hr 2-YEAR Rainfall=3.89"

Printed 7/11/2018

Summary for Subcatchment WATERSHED 3: WATERSHED 3

Runoff = 37.37 cfs @ 8.05 hrs, Volume= 14.204 af, Depth= 1.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type IA 24-hr 2-YEAR Rainfall=3.89"

Area (ac)	CN	Description
* 0.000	0	, HSG D
24.857	70	Brush, Fair, HSG C
47.562	77	Brush, Fair, HSG D
0.144	87	Dirt roads, HSG C
1.016	89	Dirt roads, HSG D
0.284	96	Gravel surface, HSG C
0.770	96	Gravel surface, HSG D
1.468	79	Pasture/grassland/range, Fair, HSG C
14.871	84	Pasture/grassland/range, Fair, HSG D
1.701	80	Pasture/grassland/range, Good, HSG D
2.312	79	Vineyard, Fair, HSG C
3.387	84	Vineyard, Fair, HSG D
0.356	79	Woods, Fair, HSG D
98.727	77	Weighted Average
98.727		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	83	0.0400	0.16		Sheet Flow, SHEET Grass: Dense n= 0.240 P2= 3.89"
2.8	1,572	0.3300	9.25		Shallow Concentrated Flow, SHALLOW Unpaved Kv= 16.1 fps
0.4	511	0.3400	19.87	268.22	Trap/Vee/Rect Channel Flow, CHANNEL 1 Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00' n= 0.040
0.9	722	0.1400	12.75	172.11	Trap/Vee/Rect Channel Flow, CHANNEL 2 Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00' n= 0.040
12.6	2,888	Total			

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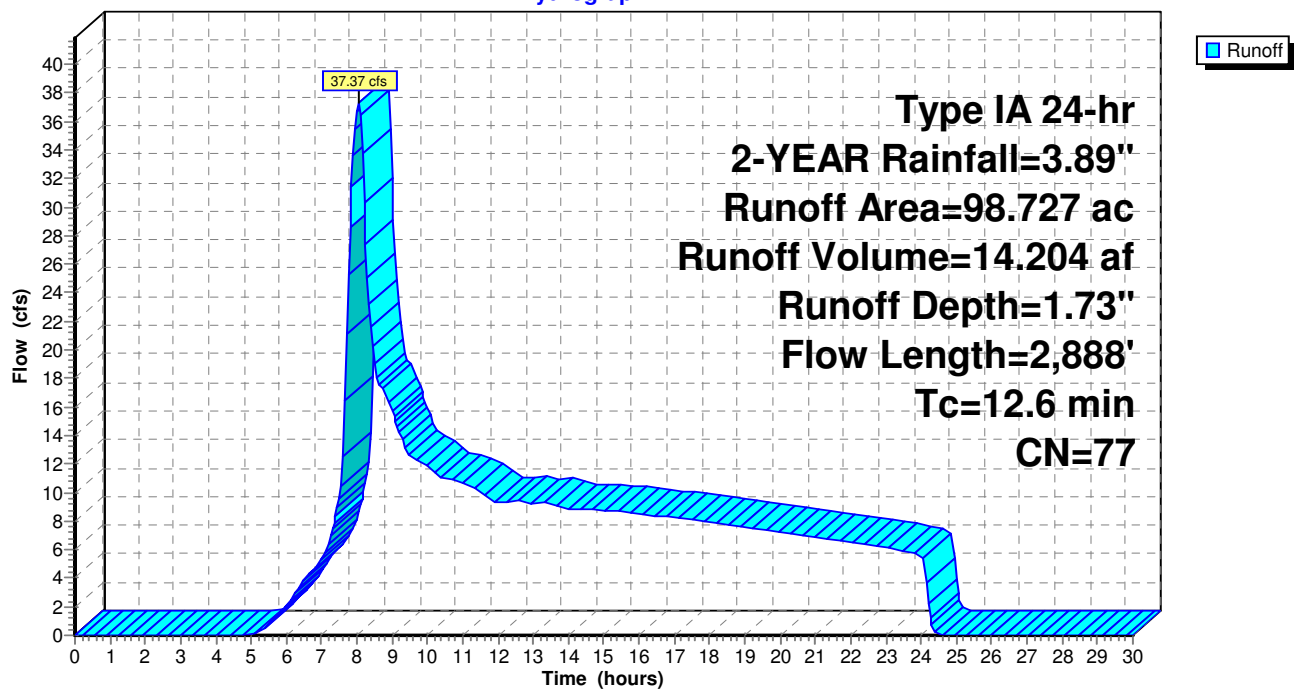
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Type IA 24-hr 2-YEAR Rainfall=3.89"

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Subcatchment WATERSHED 3: WATERSHED 3

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Type IA 24-hr 10-YEAR Rainfall=5.75"

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Summary for Subcatchment WATERSHED 3: WATERSHED 3

Runoff = 77.78 cfs @ 8.03 hrs, Volume= 26.835 af, Depth= 3.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type IA 24-hr 10-YEAR Rainfall=5.75"

Area (ac)	CN	Description
* 0.000	0	, HSG D
24.857	70	Brush, Fair, HSG C
47.562	77	Brush, Fair, HSG D
0.144	87	Dirt roads, HSG C
1.016	89	Dirt roads, HSG D
0.284	96	Gravel surface, HSG C
0.770	96	Gravel surface, HSG D
1.468	79	Pasture/grassland/range, Fair, HSG C
14.871	84	Pasture/grassland/range, Fair, HSG D
1.701	80	Pasture/grassland/range, Good, HSG D
2.312	79	Vineyard, Fair, HSG C
3.387	84	Vineyard, Fair, HSG D
0.356	79	Woods, Fair, HSG D
98.727	77	Weighted Average
98.727		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	83	0.0400	0.16		Sheet Flow, SHEET Grass: Dense n= 0.240 P2= 3.89"
2.8	1,572	0.3300	9.25		Shallow Concentrated Flow, SHALLOW Unpaved Kv= 16.1 fps
0.4	511	0.3400	19.87	268.22	Trap/Vee/Rect Channel Flow, CHANNEL 1 Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00' n= 0.040
0.9	722	0.1400	12.75	172.11	Trap/Vee/Rect Channel Flow, CHANNEL 2 Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00' n= 0.040
12.6	2,888	Total			

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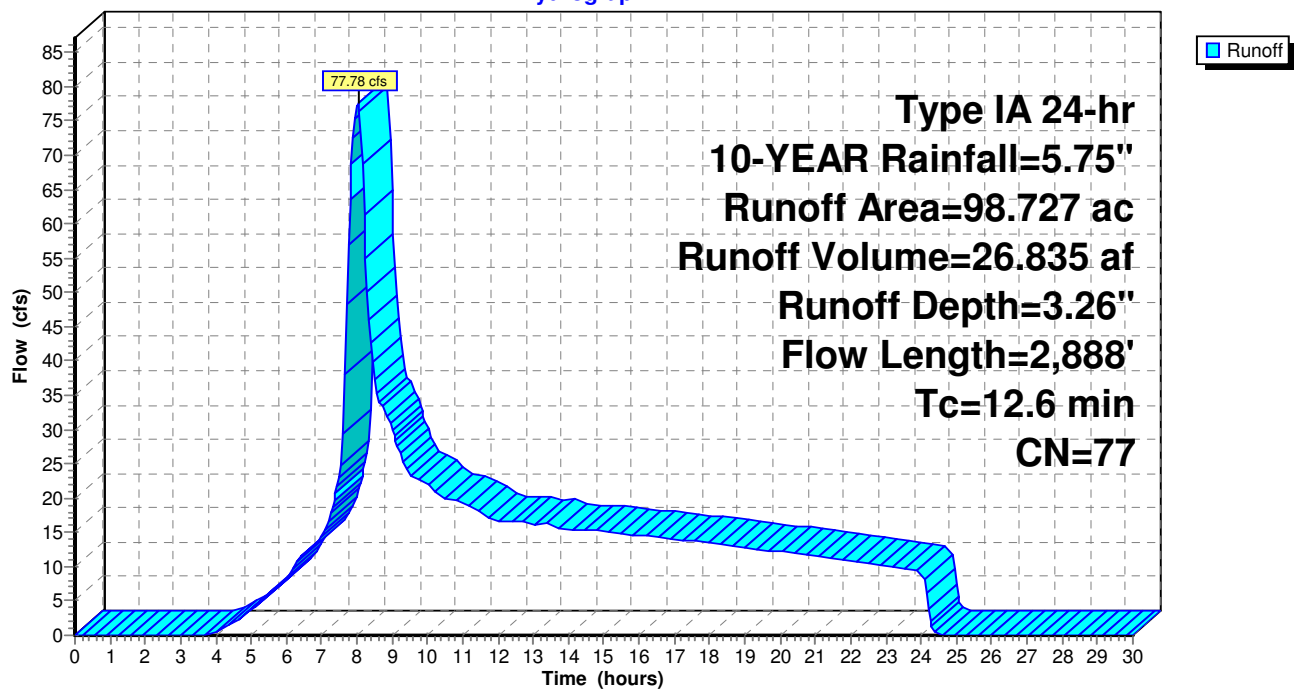
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Type IA 24-hr 10-YEAR Rainfall=5.75"

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Subcatchment WATERSHED 3: WATERSHED 3

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Type IA 24-hr 50-YEAR Rainfall=7.65"

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Summary for Subcatchment WATERSHED 3: WATERSHED 3

Runoff = 122.33 cfs @ 8.02 hrs, Volume= 40.760 af, Depth= 4.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type IA 24-hr 50-YEAR Rainfall=7.65"

Area (ac)	CN	Description
* 0.000	0	, HSG D
24.857	70	Brush, Fair, HSG C
47.562	77	Brush, Fair, HSG D
0.144	87	Dirt roads, HSG C
1.016	89	Dirt roads, HSG D
0.284	96	Gravel surface, HSG C
0.770	96	Gravel surface, HSG D
1.468	79	Pasture/grassland/range, Fair, HSG C
14.871	84	Pasture/grassland/range, Fair, HSG D
1.701	80	Pasture/grassland/range, Good, HSG D
2.312	79	Vineyard, Fair, HSG C
3.387	84	Vineyard, Fair, HSG D
0.356	79	Woods, Fair, HSG D
98.727	77	Weighted Average
98.727		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	83	0.0400	0.16		Sheet Flow, SHEET Grass: Dense n= 0.240 P2= 3.89"
2.8	1,572	0.3300	9.25		Shallow Concentrated Flow, SHALLOW Unpaved Kv= 16.1 fps
0.4	511	0.3400	19.87	268.22	Trap/Vee/Rect Channel Flow, CHANNEL 1 Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00' n= 0.040
0.9	722	0.1400	12.75	172.11	Trap/Vee/Rect Channel Flow, CHANNEL 2 Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00' n= 0.040
12.6	2,888	Total			

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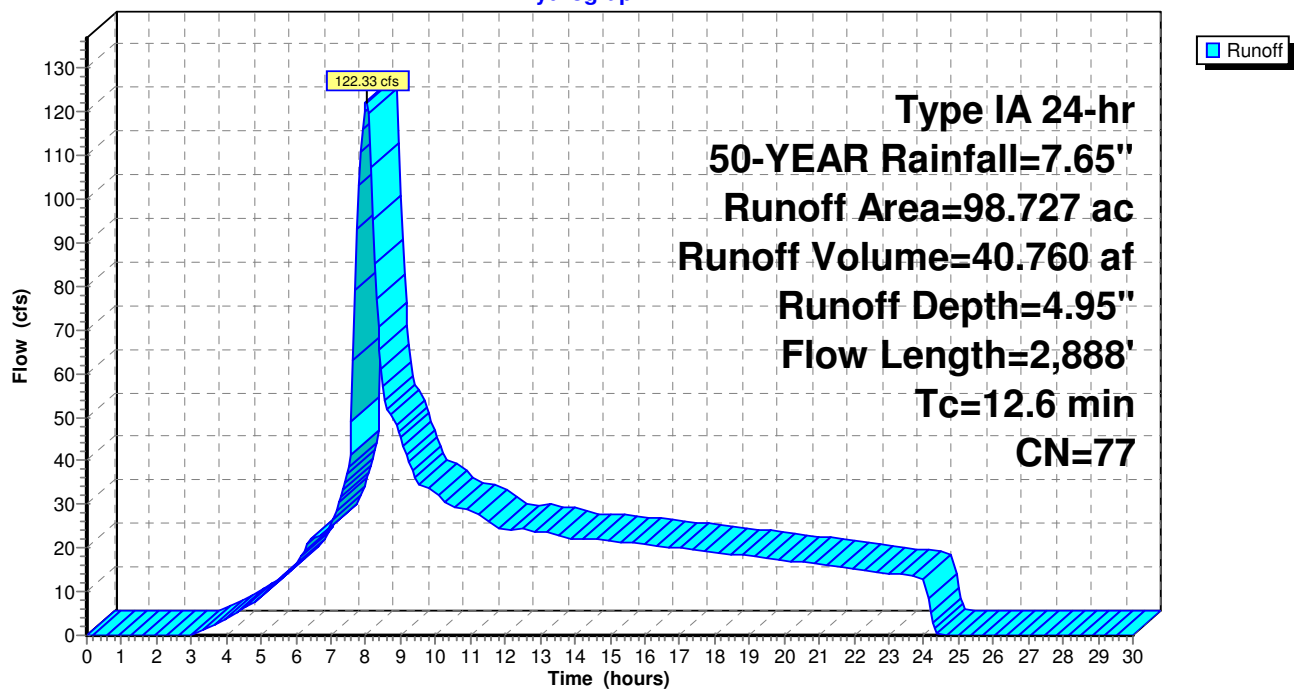
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Type IA 24-hr 50-YEAR Rainfall=7.65"

Printed 7/11/2018

Subcatchment WATERSHED 3: WATERSHED 3

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Type IA 24-hr 100-YEAR Rainfall=8.45"

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Summary for Subcatchment WATERSHED 3: WATERSHED 3

Runoff = 141.69 cfs @ 8.02 hrs, Volume= 46.803 af, Depth= 5.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type IA 24-hr 100-YEAR Rainfall=8.45"

Area (ac)	CN	Description
* 0.000	0	, HSG D
24.857	70	Brush, Fair, HSG C
47.562	77	Brush, Fair, HSG D
0.144	87	Dirt roads, HSG C
1.016	89	Dirt roads, HSG D
0.284	96	Gravel surface, HSG C
0.770	96	Gravel surface, HSG D
1.468	79	Pasture/grassland/range, Fair, HSG C
14.871	84	Pasture/grassland/range, Fair, HSG D
1.701	80	Pasture/grassland/range, Good, HSG D
2.312	79	Vineyard, Fair, HSG C
3.387	84	Vineyard, Fair, HSG D
0.356	79	Woods, Fair, HSG D
98.727	77	Weighted Average
98.727		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	83	0.0400	0.16		Sheet Flow, SHEET Grass: Dense n= 0.240 P2= 3.89"
2.8	1,572	0.3300	9.25		Shallow Concentrated Flow, SHALLOW Unpaved Kv= 16.1 fps
0.4	511	0.3400	19.87	268.22	Trap/Vee/Rect Channel Flow, CHANNEL 1 Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00' n= 0.040
0.9	722	0.1400	12.75	172.11	Trap/Vee/Rect Channel Flow, CHANNEL 2 Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00' n= 0.040
12.6	2,888	Total			

Ovid Pre-Project

Prepared by PPI Engineering.

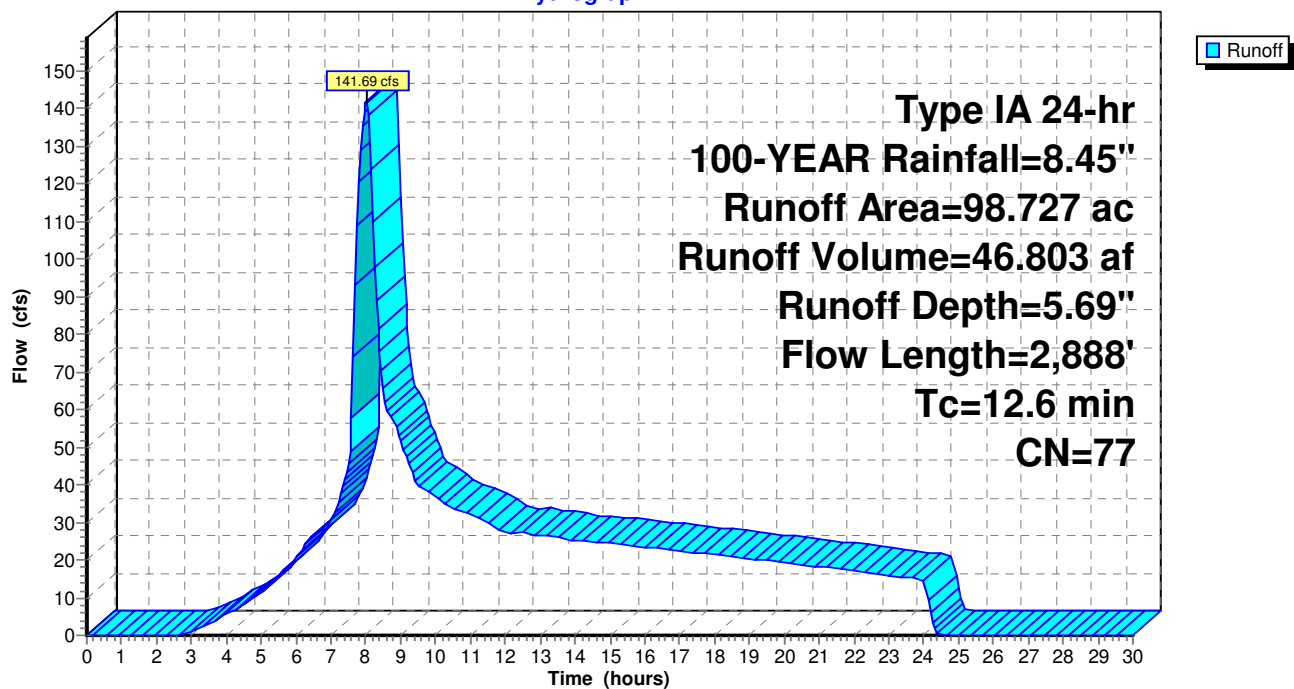
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Type IA 24-hr 100-YEAR Rainfall=8.45"

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Subcatchment WATERSHED 3: WATERSHED 3

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Type IA 24-hr 2-YEAR Rainfall=3.89"

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Summary for Subcatchment WATERSHED 3: WATERSHED 3

Runoff = 35.18 cfs @ 8.13 hrs, Volume= 14.204 af, Depth= 1.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type IA 24-hr 2-YEAR Rainfall=3.89"

Area (ac)	CN	Description
24.857	70	Brush, Fair, HSG C
39.303	77	Brush, Fair, HSG D
0.144	87	Dirt roads, HSG C
0.441	89	Dirt roads, HSG D
0.284	96	Gravel surface, HSG C
0.754	96	Gravel surface, HSG D
1.468	79	Pasture/grassland/range, Fair, HSG C
11.586	84	Pasture/grassland/range, Fair, HSG D
2.312	79	Vineyard, Fair, HSG C
3.387	84	Vineyard, Fair, HSG D
14.182	81	Vineyard, Good, HSG D
0.009	79	Woods, Fair, HSG D
98.727	77	Weighted Average
98.727		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	83	0.0400	0.16		Sheet Flow, SHEET 1 Grass: Dense n= 0.240 P2= 3.89"
2.8	727	0.0700	4.26		Shallow Concentrated Flow, SHALLOW 1 Unpaved Kv= 16.1 fps
6.4	100	0.3200	0.26		Sheet Flow, SHEET 2 Woods: Light underbrush n= 0.400 P2= 3.89"
1.0	745	0.5900	12.37		Shallow Concentrated Flow, SHALLOW 2 Unpaved Kv= 16.1 fps
0.4	511	0.3400	19.87	268.22	Trap/Vee/Rect Channel Flow, CHANNEL 1 Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00' n= 0.040
0.9	722	0.1400	12.75	172.11	Trap/Vee/Rect Channel Flow, CHANNEL 2 Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00' n= 0.040
20.0	2,888	Total			

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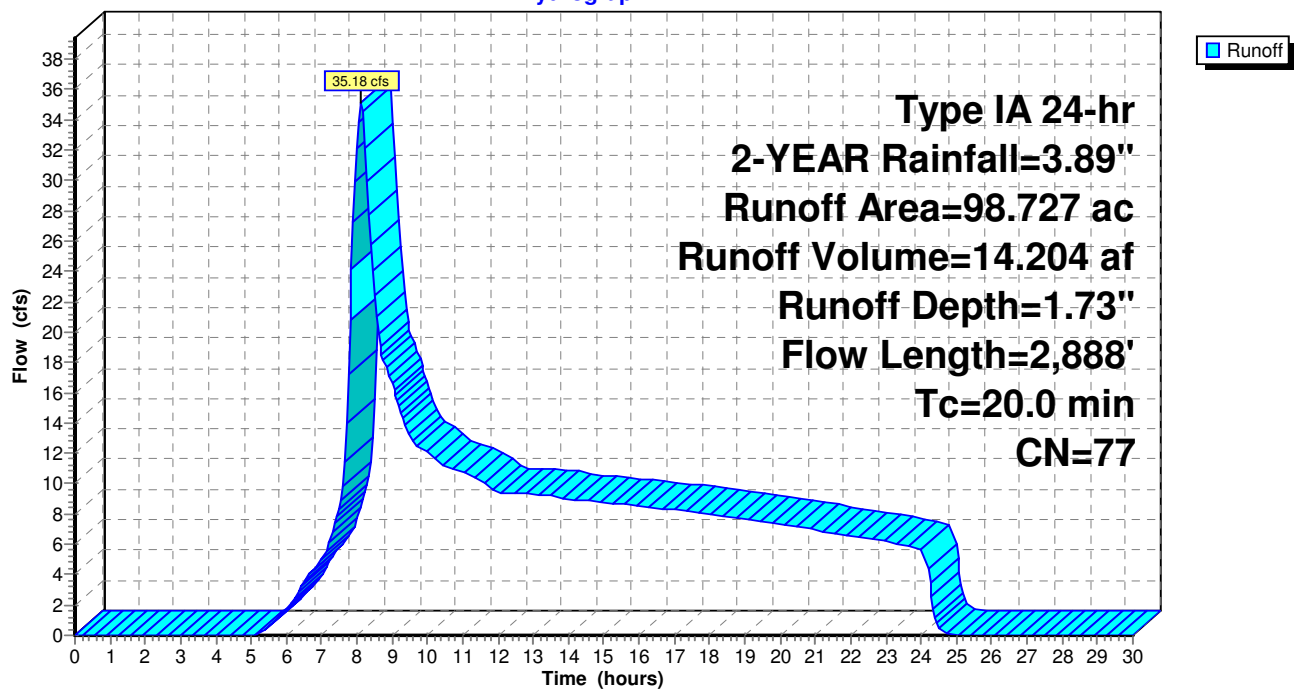
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Type IA 24-hr 2-YEAR Rainfall=3.89"

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Subcatchment WATERSHED 3: WATERSHED 3

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Type IA 24-hr 10-YEAR Rainfall=5.75"

Printed 7/11/2018

Summary for Subcatchment WATERSHED 3: WATERSHED 3

Runoff = 73.67 cfs @ 8.11 hrs, Volume= 26.835 af, Depth= 3.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type IA 24-hr 10-YEAR Rainfall=5.75"

Area (ac)	CN	Description
24.857	70	Brush, Fair, HSG C
39.303	77	Brush, Fair, HSG D
0.144	87	Dirt roads, HSG C
0.441	89	Dirt roads, HSG D
0.284	96	Gravel surface, HSG C
0.754	96	Gravel surface, HSG D
1.468	79	Pasture/grassland/range, Fair, HSG C
11.586	84	Pasture/grassland/range, Fair, HSG D
2.312	79	Vineyard, Fair, HSG C
3.387	84	Vineyard, Fair, HSG D
14.182	81	Vineyard, Good, HSG D
0.009	79	Woods, Fair, HSG D
98.727	77	Weighted Average
98.727		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	83	0.0400	0.16		Sheet Flow, SHEET 1 Grass: Dense n= 0.240 P2= 3.89"
2.8	727	0.0700	4.26		Shallow Concentrated Flow, SHALLOW 1 Unpaved Kv= 16.1 fps
6.4	100	0.3200	0.26		Sheet Flow, SHEET 2 Woods: Light underbrush n= 0.400 P2= 3.89"
1.0	745	0.5900	12.37		Shallow Concentrated Flow, SHALLOW 2 Unpaved Kv= 16.1 fps
0.4	511	0.3400	19.87	268.22	Trap/Vee/Rect Channel Flow, CHANNEL 1 Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00' n= 0.040
0.9	722	0.1400	12.75	172.11	Trap/Vee/Rect Channel Flow, CHANNEL 2 Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00' n= 0.040
20.0	2,888	Total			

Ovid Post-Project

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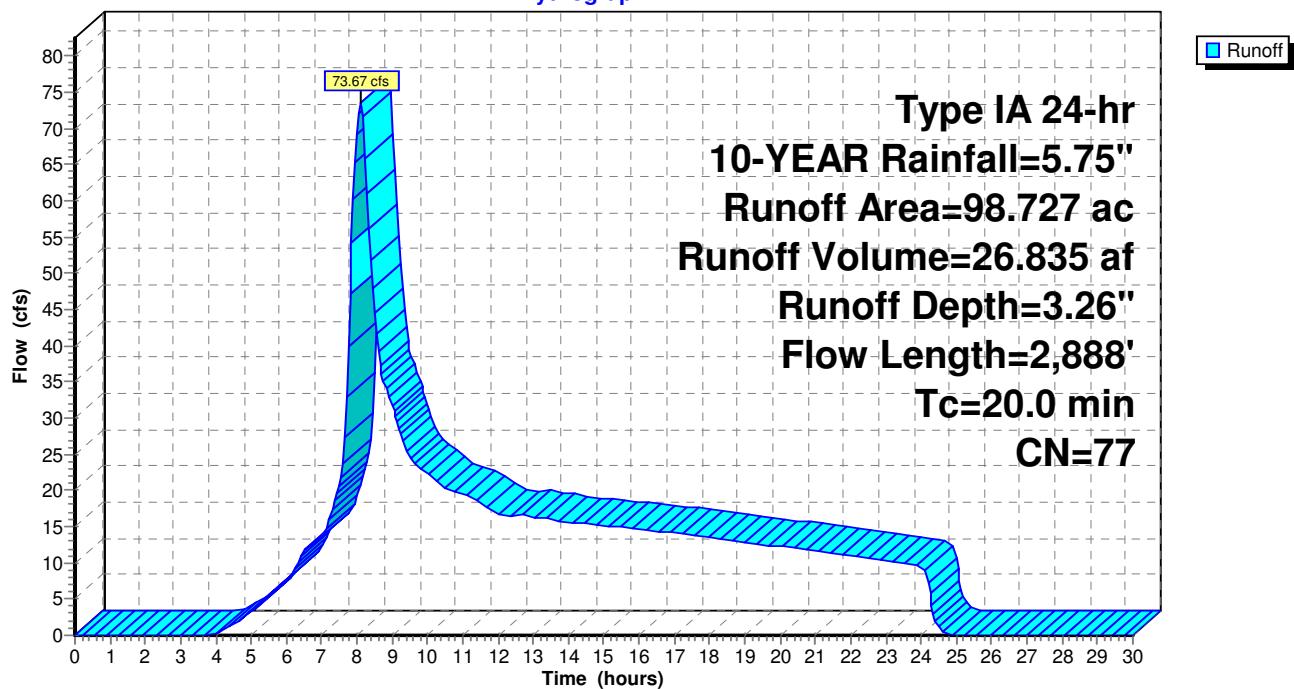
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Type IA 24-hr 10-YEAR Rainfall=5.75"

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Subcatchment WATERSHED 3: WATERSHED 3

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Type IA 24-hr 50-YEAR Rainfall=7.65"

Printed 7/11/2018

Summary for Subcatchment WATERSHED 3: WATERSHED 3

Runoff = 116.54 cfs @ 8.10 hrs, Volume= 40.760 af, Depth= 4.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type IA 24-hr 50-YEAR Rainfall=7.65"

Area (ac)	CN	Description
24.857	70	Brush, Fair, HSG C
39.303	77	Brush, Fair, HSG D
0.144	87	Dirt roads, HSG C
0.441	89	Dirt roads, HSG D
0.284	96	Gravel surface, HSG C
0.754	96	Gravel surface, HSG D
1.468	79	Pasture/grassland/range, Fair, HSG C
11.586	84	Pasture/grassland/range, Fair, HSG D
2.312	79	Vineyard, Fair, HSG C
3.387	84	Vineyard, Fair, HSG D
14.182	81	Vineyard, Good, HSG D
0.009	79	Woods, Fair, HSG D
98.727	77	Weighted Average
98.727		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	83	0.0400	0.16		Sheet Flow, SHEET 1 Grass: Dense n= 0.240 P2= 3.89"
2.8	727	0.0700	4.26		Shallow Concentrated Flow, SHALLOW 1 Unpaved Kv= 16.1 fps
6.4	100	0.3200	0.26		Sheet Flow, SHEET 2 Woods: Light underbrush n= 0.400 P2= 3.89"
1.0	745	0.5900	12.37		Shallow Concentrated Flow, SHALLOW 2 Unpaved Kv= 16.1 fps
0.4	511	0.3400	19.87	268.22	Trap/Vee/Rect Channel Flow, CHANNEL 1 Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00' n= 0.040
0.9	722	0.1400	12.75	172.11	Trap/Vee/Rect Channel Flow, CHANNEL 2 Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00' n= 0.040
20.0	2,888	Total			

Ovid Post-Project

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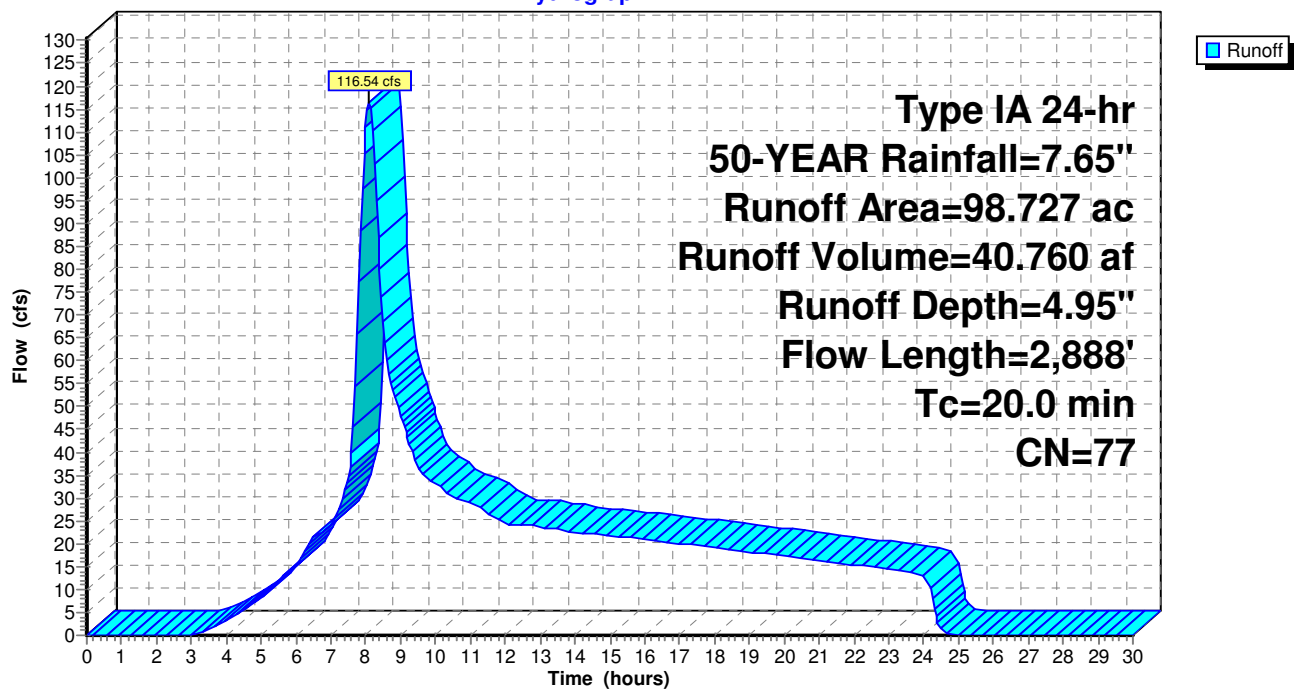
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Type IA 24-hr 50-YEAR Rainfall=7.65"

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Subcatchment WATERSHED 3: WATERSHED 3

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Type IA 24-hr 100-YEAR Rainfall=8.45"

Printed 7/11/2018

Summary for Subcatchment WATERSHED 3: WATERSHED 3

Runoff = 135.10 cfs @ 8.10 hrs, Volume= 46.803 af, Depth= 5.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type IA 24-hr 100-YEAR Rainfall=8.45"

Area (ac)	CN	Description
24.857	70	Brush, Fair, HSG C
39.303	77	Brush, Fair, HSG D
0.144	87	Dirt roads, HSG C
0.441	89	Dirt roads, HSG D
0.284	96	Gravel surface, HSG C
0.754	96	Gravel surface, HSG D
1.468	79	Pasture/grassland/range, Fair, HSG C
11.586	84	Pasture/grassland/range, Fair, HSG D
2.312	79	Vineyard, Fair, HSG C
3.387	84	Vineyard, Fair, HSG D
14.182	81	Vineyard, Good, HSG D
0.009	79	Woods, Fair, HSG D
98.727	77	Weighted Average
98.727		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	83	0.0400	0.16		Sheet Flow, SHEET 1 Grass: Dense n= 0.240 P2= 3.89"
2.8	727	0.0700	4.26		Shallow Concentrated Flow, SHALLOW 1 Unpaved Kv= 16.1 fps
6.4	100	0.3200	0.26		Sheet Flow, SHEET 2 Woods: Light underbrush n= 0.400 P2= 3.89"
1.0	745	0.5900	12.37		Shallow Concentrated Flow, SHALLOW 2 Unpaved Kv= 16.1 fps
0.4	511	0.3400	19.87	268.22	Trap/Vee/Rect Channel Flow, CHANNEL 1 Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00' n= 0.040
0.9	722	0.1400	12.75	172.11	Trap/Vee/Rect Channel Flow, CHANNEL 2 Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00' n= 0.040
20.0	2,888	Total			

Ovid Post-Project

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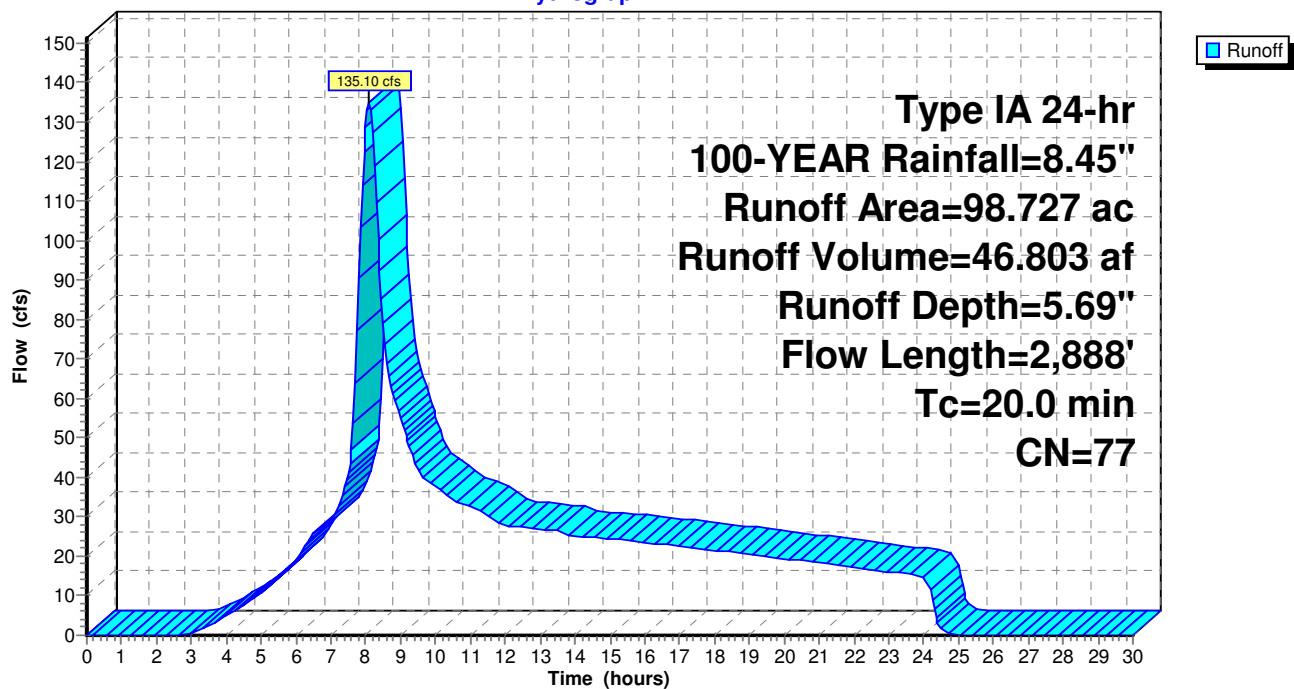
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Type IA 24-hr 100-YEAR Rainfall=8.45"

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Subcatchment WATERSHED 3: WATERSHED 3

Hydrograph



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Type IA 24-hr 2-YEAR Rainfall=3.89"

Printed 7/11/2018

Summary for Subcatchment WATERSHED 4: WATERSHED 4

Runoff = 26.34 cfs @ 8.03 hrs, Volume= 9.593 af, Depth= 1.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type IA 24-hr 2-YEAR Rainfall=3.89"

Area (ac)	CN	Description
* 0.000	0	, HSG D
0.205	70	Brush, Fair, HSG C
45.244	77	Brush, Fair, HSG D
0.609	89	Dirt roads, HSG D
0.212	96	Gravel surface, HSG D
8.617	84	Pasture/grassland/range, Fair, HSG D
2.162	93	Paved roads w/open ditches, 50% imp, HSG D
4.362	84	Vineyard, Fair, HSG D
61.410	79	Weighted Average
60.329		98.24% Pervious Area
1.081		1.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	83	0.0400	0.16		Sheet Flow, SHEET Grass: Dense n= 0.240 P2= 3.89"
2.0	952	0.2400	7.89		Shallow Concentrated Flow, SHALLOW Unpaved Kv= 16.1 fps
1.2	1,337	0.3000	18.66	251.95	Trap/Vee/Rect Channel Flow, CHANNEL Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00' n= 0.040
11.7	2,372	Total			

Ovid Pre-Project

Prepared by PPI Engineering.

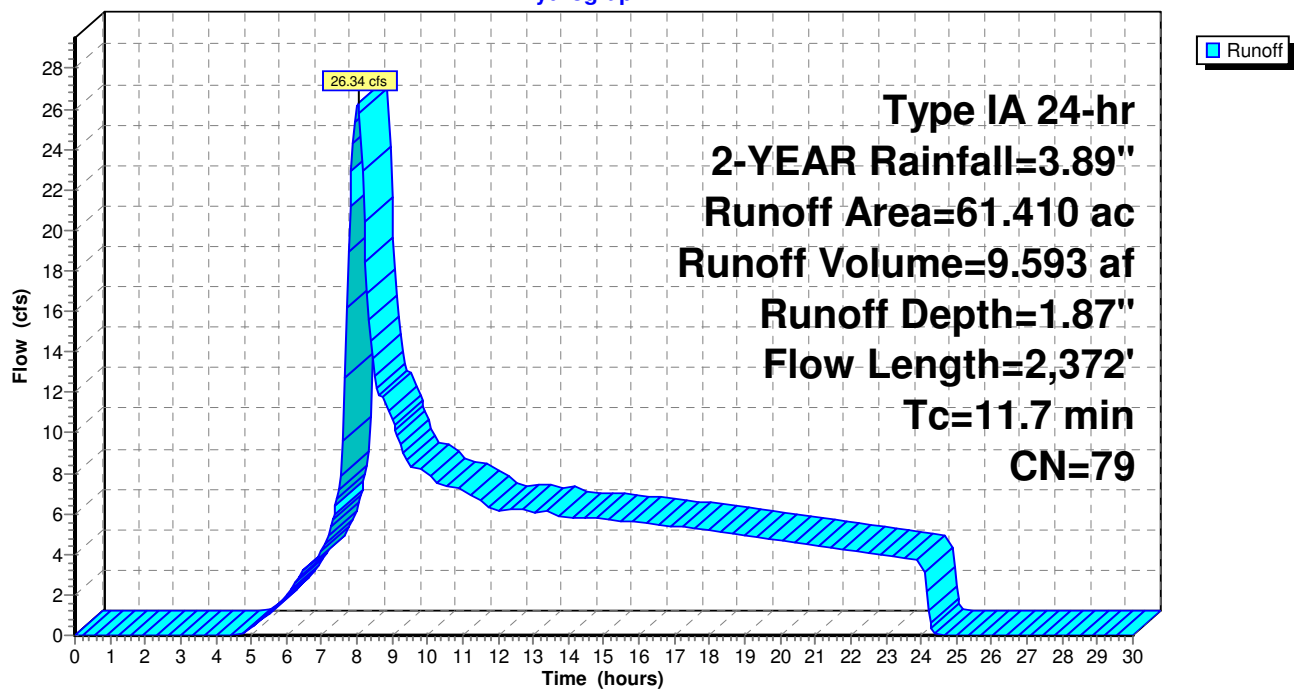
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Type IA 24-hr 2-YEAR Rainfall=3.89"

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Subcatchment WATERSHED 4: WATERSHED 4

Hydrograph



Ovid Pre-Project

Prepared by PPI Engineering.

Type IA 24-hr 10-YEAR Rainfall=5.75"

Printed 7/11/2018

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Summary for Subcatchment WATERSHED 4: WATERSHED 4

Runoff = 52.31 cfs @ 8.02 hrs, Volume= 17.693 af, Depth= 3.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type IA 24-hr 10-YEAR Rainfall=5.75"

Area (ac)	CN	Description
* 0.000	0	, HSG D
0.205	70	Brush, Fair, HSG C
45.244	77	Brush, Fair, HSG D
0.609	89	Dirt roads, HSG D
0.212	96	Gravel surface, HSG D
8.617	84	Pasture/grassland/range, Fair, HSG D
2.162	93	Paved roads w/open ditches, 50% imp, HSG D
4.362	84	Vineyard, Fair, HSG D
61.410	79	Weighted Average
60.329		98.24% Pervious Area
1.081		1.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	83	0.0400	0.16		Sheet Flow, SHEET Grass: Dense n= 0.240 P2= 3.89"
2.0	952	0.2400	7.89		Shallow Concentrated Flow, SHALLOW Unpaved Kv= 16.1 fps
1.2	1,337	0.3000	18.66	251.95	Trap/Vee/Rect Channel Flow, CHANNEL Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00' n= 0.040
11.7	2,372	Total			

Ovid Pre-Project

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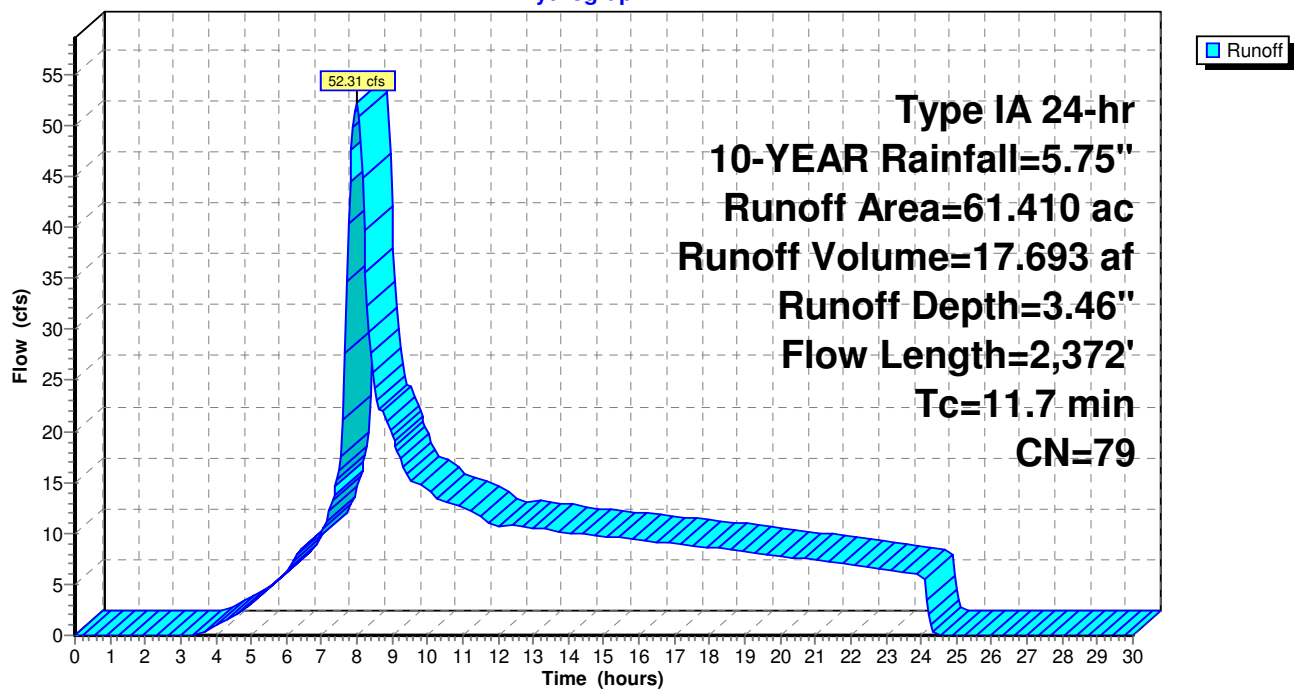
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Type IA 24-hr 10-YEAR Rainfall=5.75"

Printed 7/11/2018

Subcatchment WATERSHED 4: WATERSHED 4

Hydrograph



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Prepared by PPI Engineering.

Type IA 24-hr 50-YEAR Rainfall=7.65"

Printed 7/11/2018

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Summary for Subcatchment WATERSHED 4: WATERSHED 4

Runoff = 80.75 cfs @ 8.00 hrs, Volume= 26.524 af, Depth= 5.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type IA 24-hr 50-YEAR Rainfall=7.65"

Area (ac)	CN	Description
* 0.000	0	, HSG D
0.205	70	Brush, Fair, HSG C
45.244	77	Brush, Fair, HSG D
0.609	89	Dirt roads, HSG D
0.212	96	Gravel surface, HSG D
8.617	84	Pasture/grassland/range, Fair, HSG D
2.162	93	Paved roads w/open ditches, 50% imp, HSG D
4.362	84	Vineyard, Fair, HSG D
61.410	79	Weighted Average
60.329		98.24% Pervious Area
1.081		1.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	83	0.0400	0.16		Sheet Flow, SHEET
					Grass: Dense n= 0.240 P2= 3.89"
2.0	952	0.2400	7.89		Shallow Concentrated Flow, SHALLOW
					Unpaved Kv= 16.1 fps
1.2	1,337	0.3000	18.66	251.95	Trap/Vee/Rect Channel Flow, CHANNEL
					Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00'
					n= 0.040
11.7	2,372	Total			

Ovid Pre-Project

Prepared by PPI Engineering.

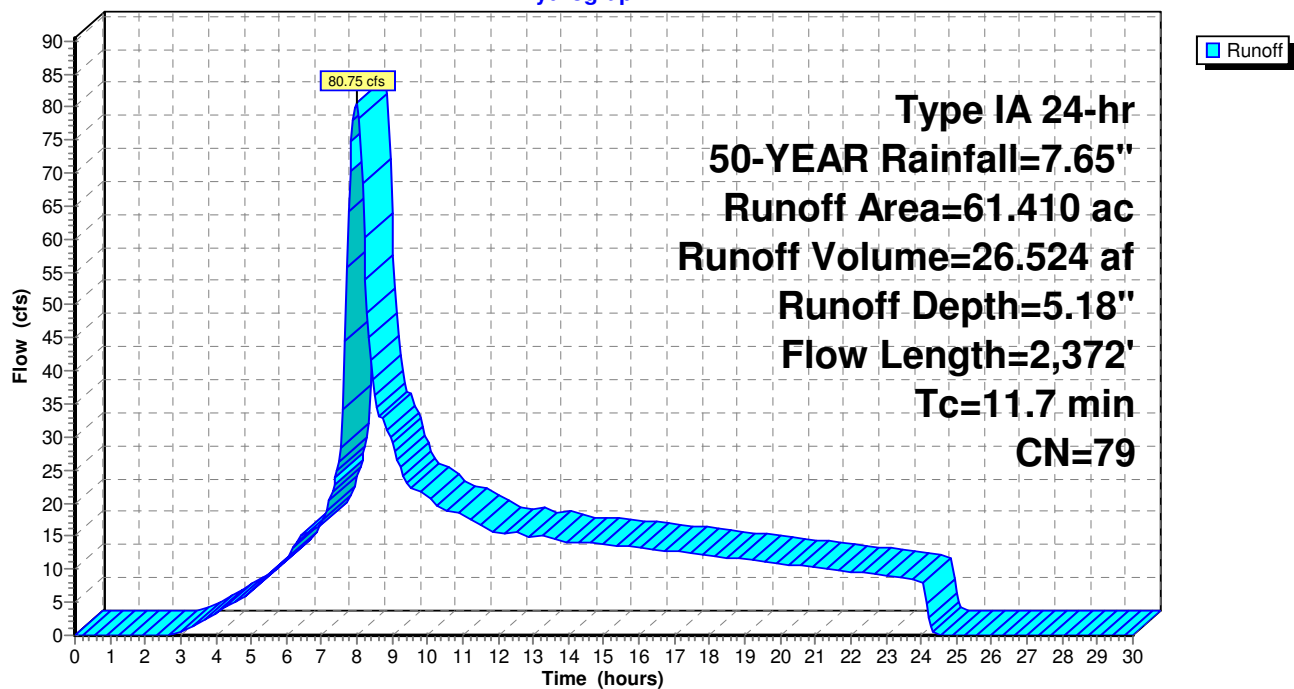
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Type IA 24-hr 50-YEAR Rainfall=7.65"

Printed 7/11/2018

Subcatchment WATERSHED 4: WATERSHED 4

Hydrograph



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Type IA 24-hr 100-YEAR Rainfall=8.45"

Printed 7/11/2018

Summary for Subcatchment WATERSHED 4: WATERSHED 4

Runoff = 92.97 cfs @ 8.00 hrs, Volume= 30.338 af, Depth= 5.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type IA 24-hr 100-YEAR Rainfall=8.45"

Area (ac)	CN	Description
* 0.000	0	, HSG D
0.205	70	Brush, Fair, HSG C
45.244	77	Brush, Fair, HSG D
0.609	89	Dirt roads, HSG D
0.212	96	Gravel surface, HSG D
8.617	84	Pasture/grassland/range, Fair, HSG D
2.162	93	Paved roads w/open ditches, 50% imp, HSG D
4.362	84	Vineyard, Fair, HSG D
61.410	79	Weighted Average
60.329		98.24% Pervious Area
1.081		1.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	83	0.0400	0.16		Sheet Flow, SHEET
					Grass: Dense n= 0.240 P2= 3.89"
2.0	952	0.2400	7.89		Shallow Concentrated Flow, SHALLOW
					Unpaved Kv= 16.1 fps
1.2	1,337	0.3000	18.66	251.95	Trap/Vee/Rect Channel Flow, CHANNEL
					Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00'
					n= 0.040
11.7	2,372	Total			

Ovid Pre-Project

Prepared by PPI Engineering.

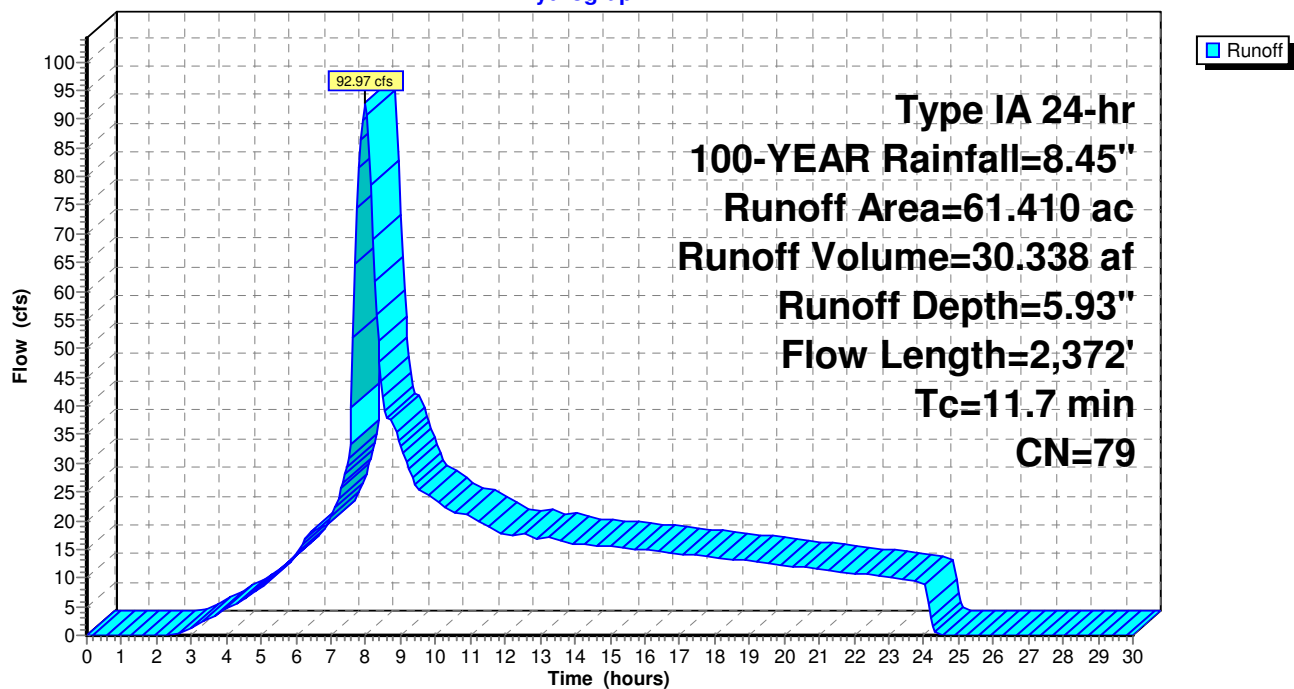
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Type IA 24-hr 100-YEAR Rainfall=8.45"

Printed 7/11/2018

Subcatchment WATERSHED 4: WATERSHED 4

Hydrograph



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Type IA 24-hr 2-YEAR Rainfall=3.89"

Printed 7/11/2018

Summary for Subcatchment WATERSHED 4: WATERSHED 4

Runoff = 26.34 cfs @ 8.03 hrs, Volume= 9.593 af, Depth= 1.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type IA 24-hr 2-YEAR Rainfall=3.89"

Area (ac)	CN	Description
* 0.000	0	, HSG D
0.205	70	Brush, Fair, HSG C
42.726	77	Brush, Fair, HSG D
0.503	89	Dirt roads, HSG D
0.212	96	Gravel surface, HSG D
1.241	84	Pasture/grassland/range, Fair, HSG D
2.144	93	Paved roads w/open ditches, 50% imp, HSG D
4.362	84	Vineyard, Fair, HSG D
10.017	81	Vineyard, Good, HSG D
61.410	79	Weighted Average
60.338		98.25% Pervious Area
1.072		1.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	83	0.0400	0.16		Sheet Flow, SHEET
					Grass: Dense n= 0.240 P2= 3.89"
2.0	952	0.2400	7.89		Shallow Concentrated Flow, SHALLOW
					Unpaved Kv= 16.1 fps
1.2	1,337	0.3000	18.66	251.95	Trap/Vee/Rect Channel Flow, CHANNEL
					Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00'
					n= 0.040
11.7	2,372	Total			

Ovid Post-Project

Prepared by PPI Engineering.

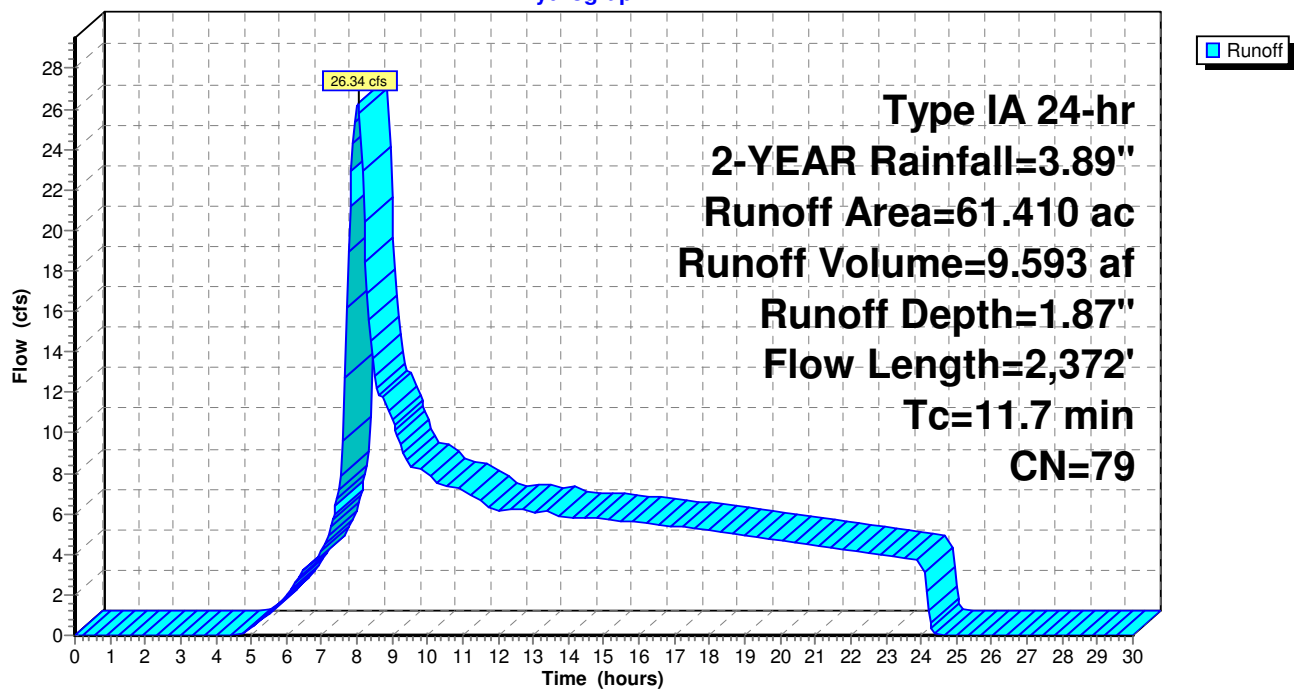
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Type IA 24-hr 2-YEAR Rainfall=3.89"

Printed 7/11/2018

Subcatchment WATERSHED 4: WATERSHED 4

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Ovid Post-Project

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Type IA 24-hr 10-YEAR Rainfall=5.75"

Printed 7/11/2018

Summary for Subcatchment WATERSHED 4: WATERSHED 4

Runoff = 52.31 cfs @ 8.02 hrs, Volume= 17.693 af, Depth= 3.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type IA 24-hr 10-YEAR Rainfall=5.75"

Area (ac)	CN	Description
* 0.000	0	, HSG D
0.205	70	Brush, Fair, HSG C
42.726	77	Brush, Fair, HSG D
0.503	89	Dirt roads, HSG D
0.212	96	Gravel surface, HSG D
1.241	84	Pasture/grassland/range, Fair, HSG D
2.144	93	Paved roads w/open ditches, 50% imp, HSG D
4.362	84	Vineyard, Fair, HSG D
10.017	81	Vineyard, Good, HSG D
61.410	79	Weighted Average
60.338		98.25% Pervious Area
1.072		1.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	83	0.0400	0.16		Sheet Flow, SHEET
					Grass: Dense n= 0.240 P2= 3.89"
2.0	952	0.2400	7.89		Shallow Concentrated Flow, SHALLOW
					Unpaved Kv= 16.1 fps
1.2	1,337	0.3000	18.66	251.95	Trap/Vee/Rect Channel Flow, CHANNEL
					Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00'
					n= 0.040
11.7	2,372	Total			

Ovid Post-Project

Prepared by PPI Engineering.

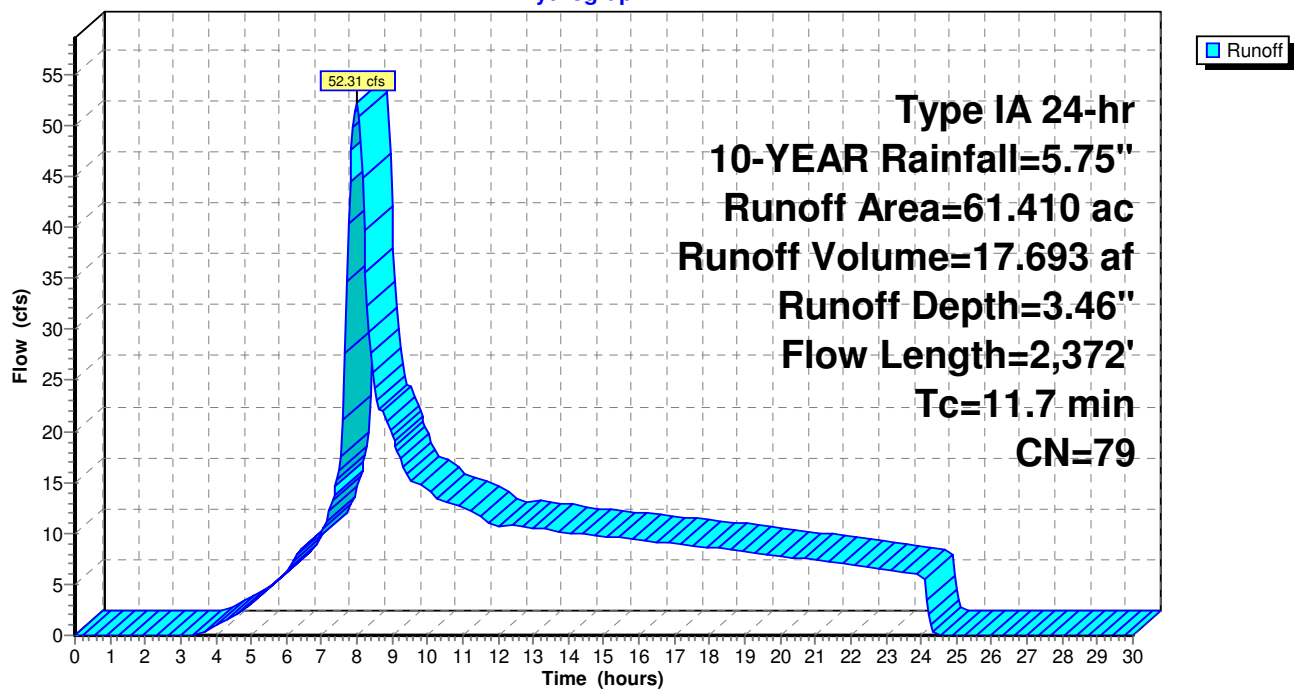
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Type IA 24-hr 10-YEAR Rainfall=5.75"

Printed 7/11/2018

Subcatchment WATERSHED 4: WATERSHED 4

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Prepared by PPI Engineering.

Type IA 24-hr 50-YEAR Rainfall=7.65"

Printed 7/11/2018

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Summary for Subcatchment WATERSHED 4: WATERSHED 4

Runoff = 80.75 cfs @ 8.00 hrs, Volume= 26.524 af, Depth= 5.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type IA 24-hr 50-YEAR Rainfall=7.65"

Area (ac)	CN	Description
* 0.000	0	, HSG D
0.205	70	Brush, Fair, HSG C
42.726	77	Brush, Fair, HSG D
0.503	89	Dirt roads, HSG D
0.212	96	Gravel surface, HSG D
1.241	84	Pasture/grassland/range, Fair, HSG D
2.144	93	Paved roads w/open ditches, 50% imp, HSG D
4.362	84	Vineyard, Fair, HSG D
10.017	81	Vineyard, Good, HSG D
61.410	79	Weighted Average
60.338		98.25% Pervious Area
1.072		1.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	83	0.0400	0.16		Sheet Flow, SHEET
					Grass: Dense n= 0.240 P2= 3.89"
2.0	952	0.2400	7.89		Shallow Concentrated Flow, SHALLOW
					Unpaved Kv= 16.1 fps
1.2	1,337	0.3000	18.66	251.95	Trap/Vee/Rect Channel Flow, CHANNEL
					Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00'
					n= 0.040
11.7	2,372	Total			

Ovid Post-Project

Prepared by PPI Engineering.

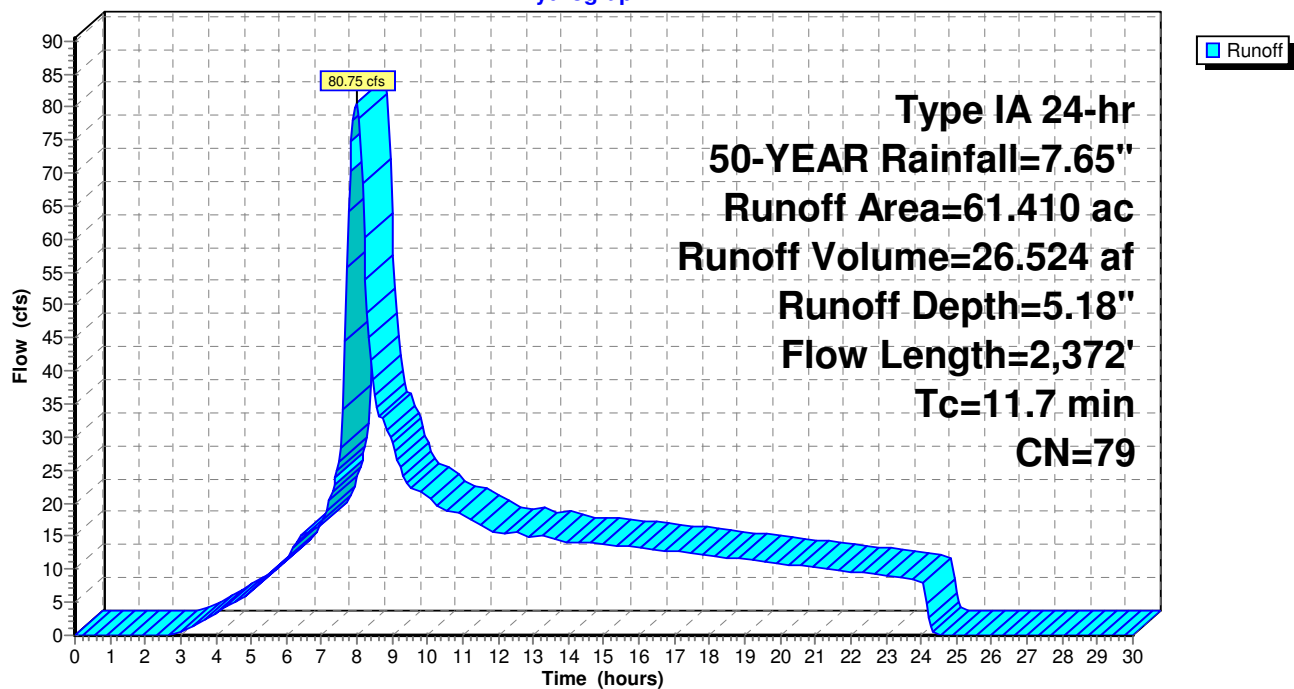
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Type IA 24-hr 50-YEAR Rainfall=7.65"

Printed 7/11/2018

Subcatchment WATERSHED 4: WATERSHED 4

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Type IA 24-hr 100-YEAR Rainfall=8.45"

Printed 7/11/2018

Summary for Subcatchment WATERSHED 4: WATERSHED 4

Runoff = 92.97 cfs @ 8.00 hrs, Volume= 30.338 af, Depth= 5.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type IA 24-hr 100-YEAR Rainfall=8.45"

Area (ac)	CN	Description
* 0.000	0	, HSG D
0.205	70	Brush, Fair, HSG C
42.726	77	Brush, Fair, HSG D
0.503	89	Dirt roads, HSG D
0.212	96	Gravel surface, HSG D
1.241	84	Pasture/grassland/range, Fair, HSG D
2.144	93	Paved roads w/open ditches, 50% imp, HSG D
4.362	84	Vineyard, Fair, HSG D
10.017	81	Vineyard, Good, HSG D
61.410	79	Weighted Average
60.338		98.25% Pervious Area
1.072		1.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	83	0.0400	0.16		Sheet Flow, SHEET
					Grass: Dense n= 0.240 P2= 3.89"
2.0	952	0.2400	7.89		Shallow Concentrated Flow, SHALLOW
					Unpaved Kv= 16.1 fps
1.2	1,337	0.3000	18.66	251.95	Trap/Vee/Rect Channel Flow, CHANNEL
					Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00'
					n= 0.040
11.7	2,372	Total			

Ovid Post-Project

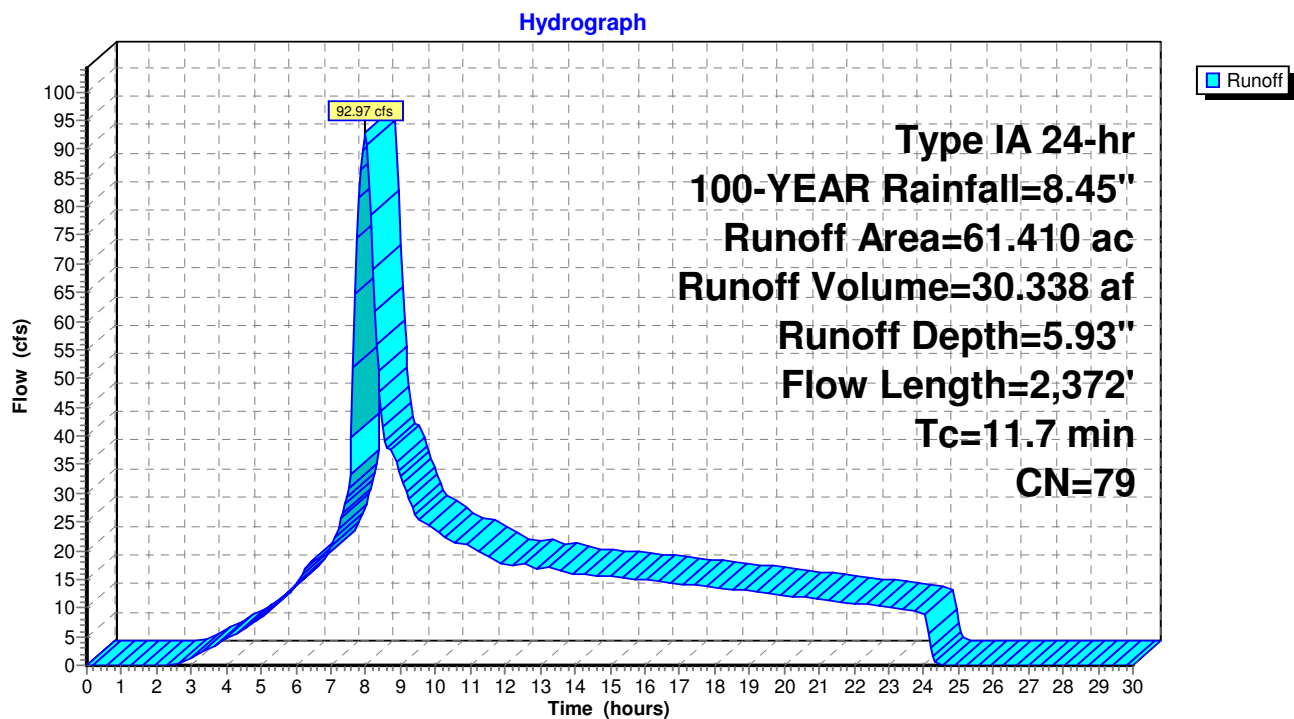
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Type IA 24-hr 100-YEAR Rainfall=8.45"

Printed 7/11/2018

Subcatchment WATERSHED 4: WATERSHED 4



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Type IA 24-hr 2-YEAR Rainfall=3.89"

Printed 7/11/2018

Summary for Reach R1: REACH 1

Inflow Area = 61.410 ac, 1.76% Impervious, Inflow Depth = 1.87" for 2-YEAR event
Inflow = 26.34 cfs @ 8.03 hrs, Volume= 9.593 af
Outflow = 25.76 cfs @ 8.15 hrs, Volume= 9.593 af, Atten= 2%, Lag= 6.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Max. Velocity= 6.99 fps, Min. Travel Time= 4.6 min

Avg. Velocity = 3.62 fps, Avg. Travel Time= 8.8 min

Peak Storage= 7,059 cf @ 8.08 hrs

Average Depth at Peak Storage= 0.66'

Bank-Full Depth= 1.50' Flow Area= 13.5 sf, Capacity= 150.00 cfs

3.00' x 1.50' deep channel, n= 0.040 Mountain streams

Side Slope Z-value= 4.0 '/' Top Width= 15.00'

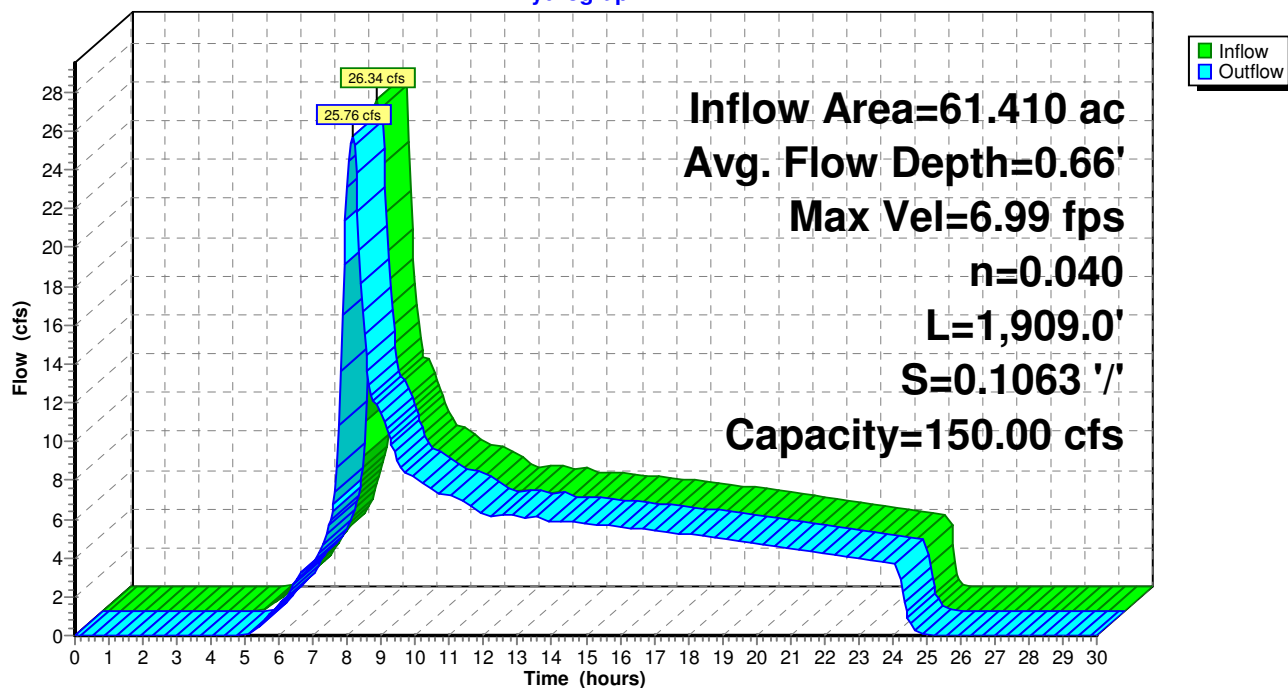
Length= 1,909.0' Slope= 0.1063 '/'

Inlet Invert= 685.00', Outlet Invert= 482.00'



Reach R1: REACH 1

Hydrograph



Ovid Pre-Project

Prepared by PPI Engineering.

HydroCAD® 10.00-17 s/n 09429 © 2016 HydroCAD Software Solutions LLC

Type IA 24-hr 10-YEAR Rainfall=5.75"

Printed 7/11/2018

Summary for Reach R1: REACH 1

Inflow Area = 61.410 ac, 1.76% Impervious, Inflow Depth = 3.46" for 10-YEAR event
Inflow = 52.31 cfs @ 8.02 hrs, Volume= 17.693 af
Outflow = 51.72 cfs @ 8.11 hrs, Volume= 17.692 af, Atten= 1%, Lag= 5.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Max. Velocity= 8.43 fps, Min. Travel Time= 3.8 min

Avg. Velocity= 4.24 fps, Avg. Travel Time= 7.5 min

Peak Storage= 11,741 cf @ 8.05 hrs

Average Depth at Peak Storage= 0.92'

Bank-Full Depth= 1.50' Flow Area= 13.5 sf, Capacity= 150.00 cfs

3.00' x 1.50' deep channel, n= 0.040 Mountain streams

Side Slope Z-value= 4.0 '/' Top Width= 15.00'

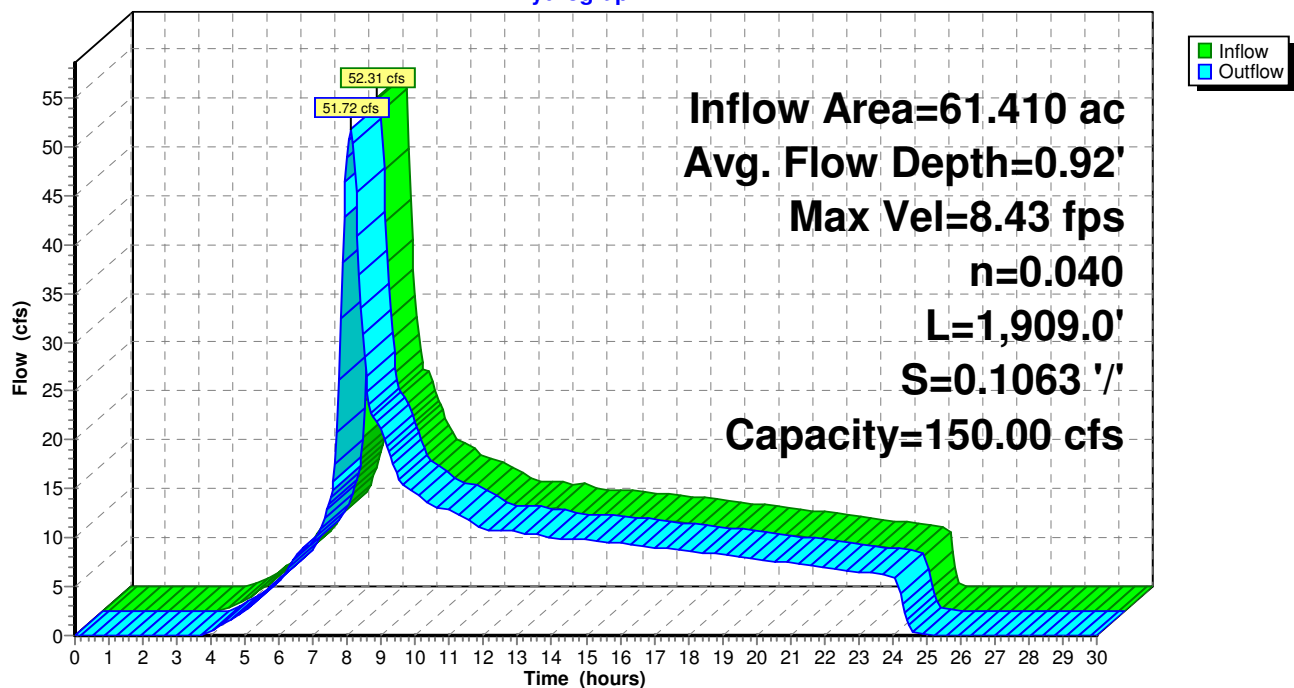
Length= 1,909.0' Slope= 0.1063 '/'

Inlet Invert= 685.00', Outlet Invert= 482.00'



Reach R1: REACH 1

Hydrograph



Ovid Pre-Project

Prepared by PPI Engineering.

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Type IA 24-hr 50-YEAR Rainfall=7.65"

Printed 7/11/2018

Summary for Reach R1: REACH 1

Inflow Area = 61.410 ac, 1.76% Impervious, Inflow Depth = 5.18" for 50-YEAR event
Inflow = 80.75 cfs @ 8.00 hrs, Volume= 26.524 af
Outflow = 80.20 cfs @ 8.09 hrs, Volume= 26.524 af, Atten= 1%, Lag= 5.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Max. Velocity= 9.45 fps, Min. Travel Time= 3.4 min

Avg. Velocity= 4.71 fps, Avg. Travel Time= 6.8 min

Peak Storage= 16,212 cf @ 8.04 hrs

Average Depth at Peak Storage= 1.13'

Bank-Full Depth= 1.50' Flow Area= 13.5 sf, Capacity= 150.00 cfs

3.00' x 1.50' deep channel, n= 0.040 Mountain streams

Side Slope Z-value= 4.0 '/' Top Width= 15.00'

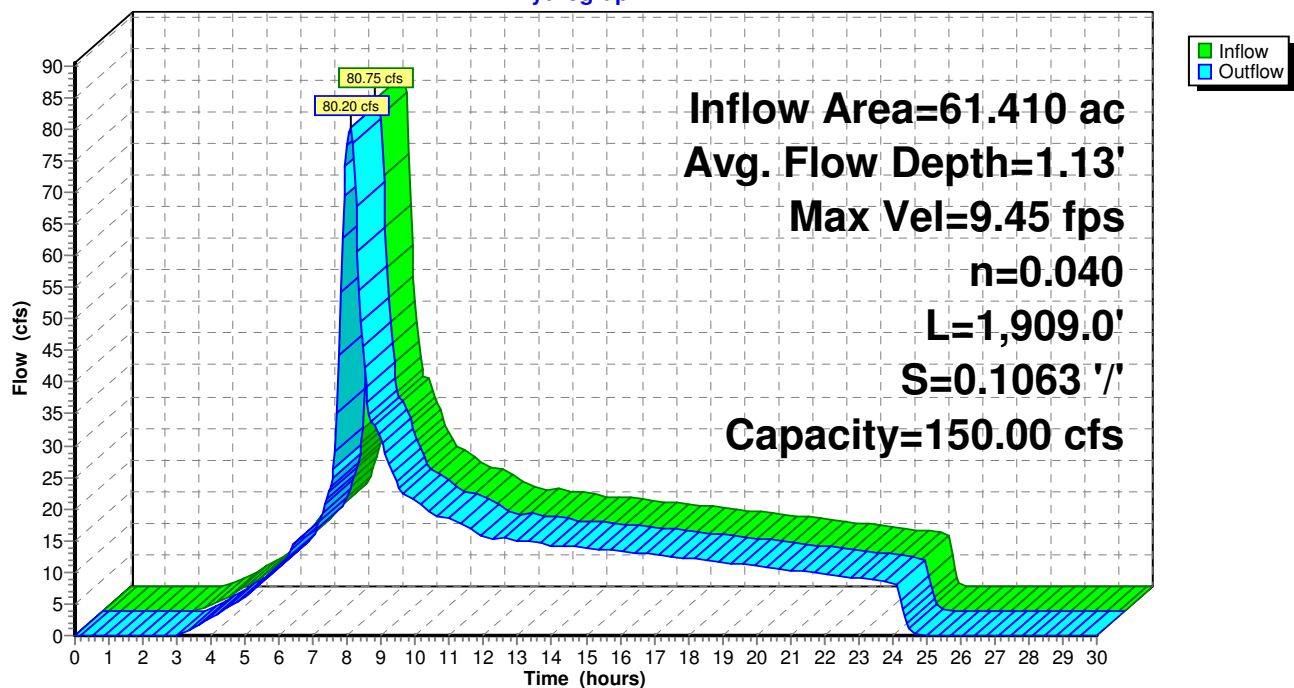
Length= 1,909.0' Slope= 0.1063 '/'

Inlet Invert= 685.00', Outlet Invert= 482.00'



Reach R1: REACH 1

Hydrograph



Ovid Pre-Project

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Type IA 24-hr 100-YEAR Rainfall=8.45"

Printed 7/11/2018

Summary for Reach R1: REACH 1

Inflow Area = 61.410 ac, 1.76% Impervious, Inflow Depth = 5.93" for 100-YEAR event
Inflow = 92.97 cfs @ 8.00 hrs, Volume= 30.338 af
Outflow = 92.44 cfs @ 8.09 hrs, Volume= 30.338 af, Atten= 1%, Lag= 5.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Max. Velocity= 9.81 fps, Min. Travel Time= 3.2 min

Avg. Velocity= 4.88 fps, Avg. Travel Time= 6.5 min

Peak Storage= 18,004 cf @ 8.03 hrs

Average Depth at Peak Storage= 1.21'

Bank-Full Depth= 1.50' Flow Area= 13.5 sf, Capacity= 150.00 cfs

3.00' x 1.50' deep channel, n= 0.040 Mountain streams

Side Slope Z-value= 4.0 '/' Top Width= 15.00'

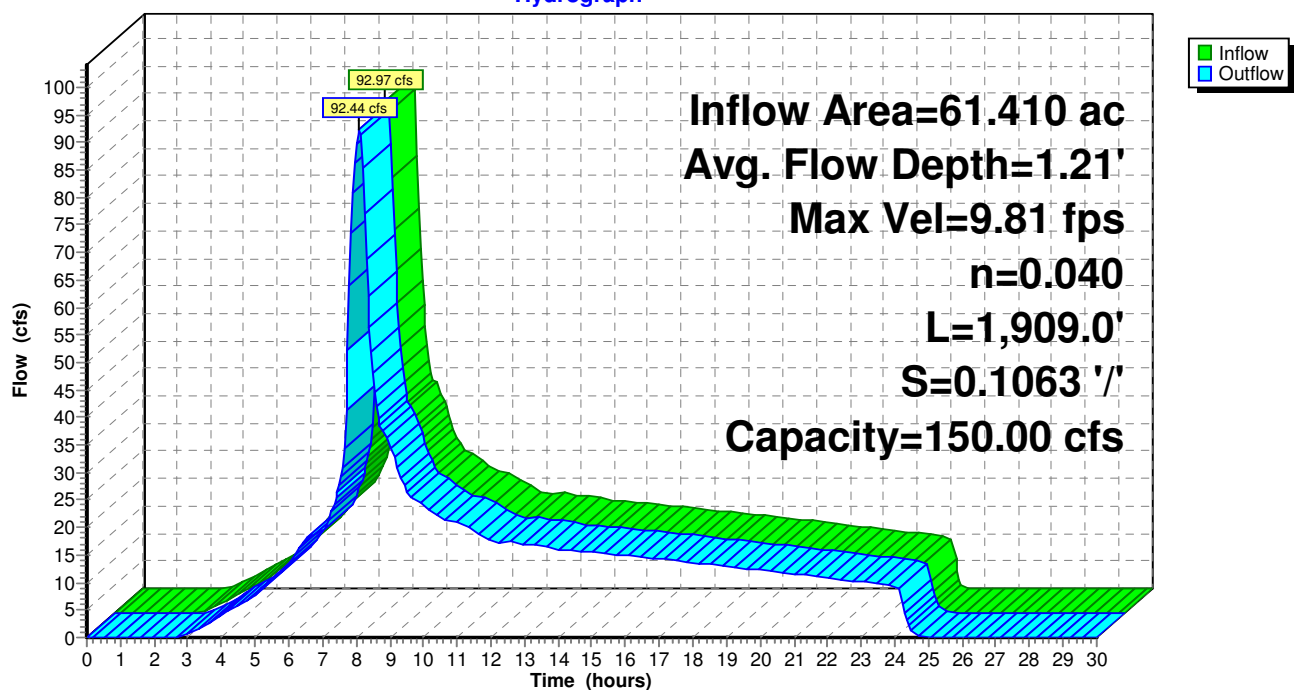
Length= 1,909.0' Slope= 0.1063 '/'

Inlet Invert= 685.00', Outlet Invert= 482.00'



Reach R1: REACH 1

Hydrograph



Ovid Post-Project

Prepared by PPI Engineering.

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Type IA 24-hr 2-YEAR Rainfall=3.89"

Printed 7/11/2018

Summary for Reach R1: REACH 1

Inflow Area = 61.410 ac, 1.75% Impervious, Inflow Depth = 1.87" for 2-YEAR event
Inflow = 26.34 cfs @ 8.03 hrs, Volume= 9.593 af
Outflow = 25.76 cfs @ 8.15 hrs, Volume= 9.593 af, Atten= 2%, Lag= 6.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Max. Velocity= 6.99 fps, Min. Travel Time= 4.6 min

Avg. Velocity= 3.62 fps, Avg. Travel Time= 8.8 min

Peak Storage= 7,059 cf @ 8.08 hrs

Average Depth at Peak Storage= 0.66'

Bank-Full Depth= 1.50' Flow Area= 13.5 sf, Capacity= 150.00 cfs

3.00' x 1.50' deep channel, n= 0.040 Mountain streams

Side Slope Z-value= 4.0 '/' Top Width= 15.00'

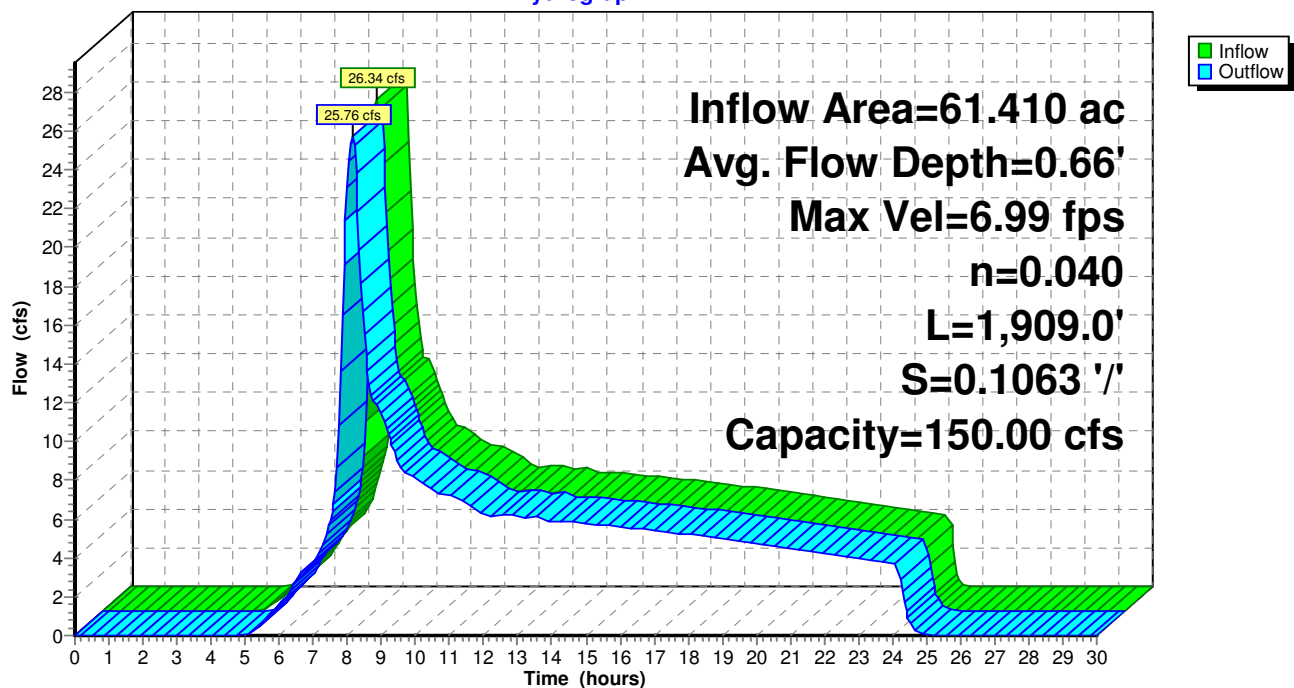
Length= 1,909.0' Slope= 0.1063 '/'

Inlet Invert= 685.00', Outlet Invert= 482.00'



Reach R1: REACH 1

Hydrograph



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Prepared by PPI Engineering.

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Type IA 24-hr 10-YEAR Rainfall=5.75"

Printed 7/11/2018

Summary for Reach R1: REACH 1

Inflow Area = 61.410 ac, 1.75% Impervious, Inflow Depth = 3.46" for 10-YEAR event
Inflow = 52.31 cfs @ 8.02 hrs, Volume= 17.693 af
Outflow = 51.72 cfs @ 8.11 hrs, Volume= 17.692 af, Atten= 1%, Lag= 5.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Max. Velocity= 8.43 fps, Min. Travel Time= 3.8 min

Avg. Velocity= 4.24 fps, Avg. Travel Time= 7.5 min

Peak Storage= 11,741 cf @ 8.05 hrs

Average Depth at Peak Storage= 0.92'

Bank-Full Depth= 1.50' Flow Area= 13.5 sf, Capacity= 150.00 cfs

3.00' x 1.50' deep channel, n= 0.040 Mountain streams

Side Slope Z-value= 4.0 '/' Top Width= 15.00'

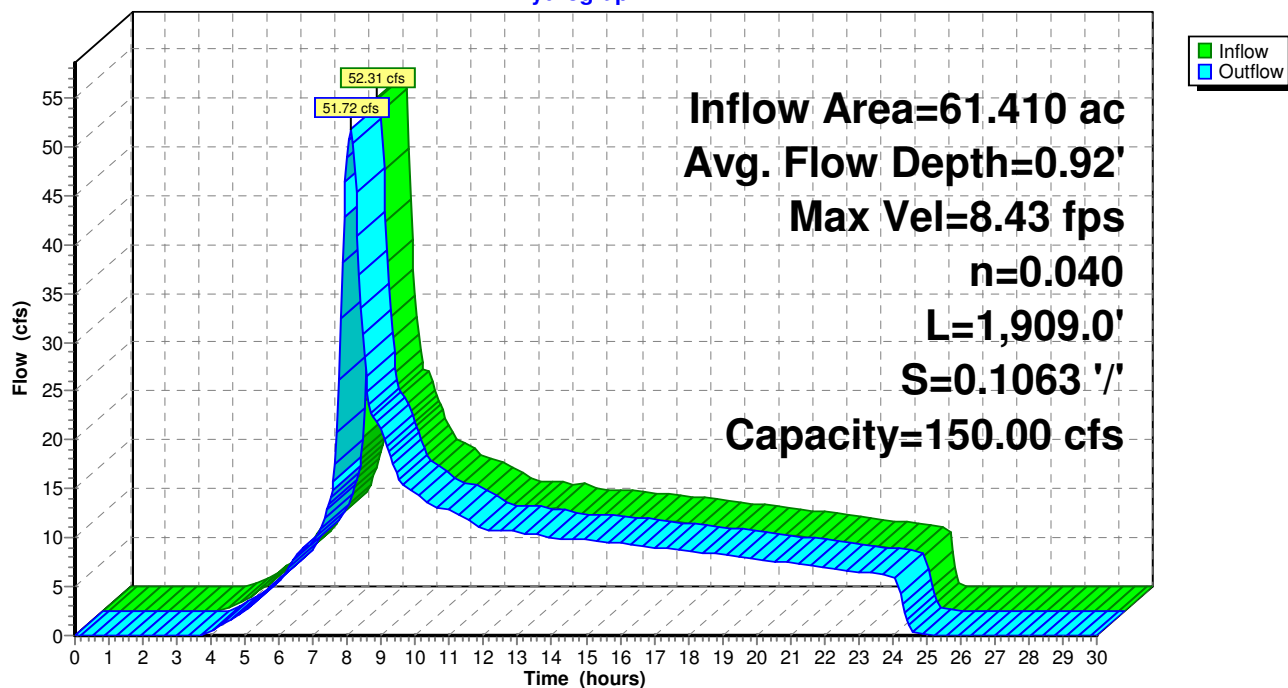
Length= 1,909.0' Slope= 0.1063 '/'

Inlet Invert= 685.00', Outlet Invert= 482.00'



Reach R1: REACH 1

Hydrograph



Ovid Post-Project

Prepared by PPI Engineering.

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Type IA 24-hr 50-YEAR Rainfall=7.65"

Printed 7/11/2018

Summary for Reach R1: REACH 1

Inflow Area = 61.410 ac, 1.75% Impervious, Inflow Depth = 5.18" for 50-YEAR event
Inflow = 80.75 cfs @ 8.00 hrs, Volume= 26.524 af
Outflow = 80.20 cfs @ 8.09 hrs, Volume= 26.524 af, Atten= 1%, Lag= 5.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Max. Velocity= 9.45 fps, Min. Travel Time= 3.4 min

Avg. Velocity= 4.71 fps, Avg. Travel Time= 6.8 min

Peak Storage= 16,212 cf @ 8.04 hrs

Average Depth at Peak Storage= 1.13'

Bank-Full Depth= 1.50' Flow Area= 13.5 sf, Capacity= 150.00 cfs

3.00' x 1.50' deep channel, n= 0.040 Mountain streams

Side Slope Z-value= 4.0 '/' Top Width= 15.00'

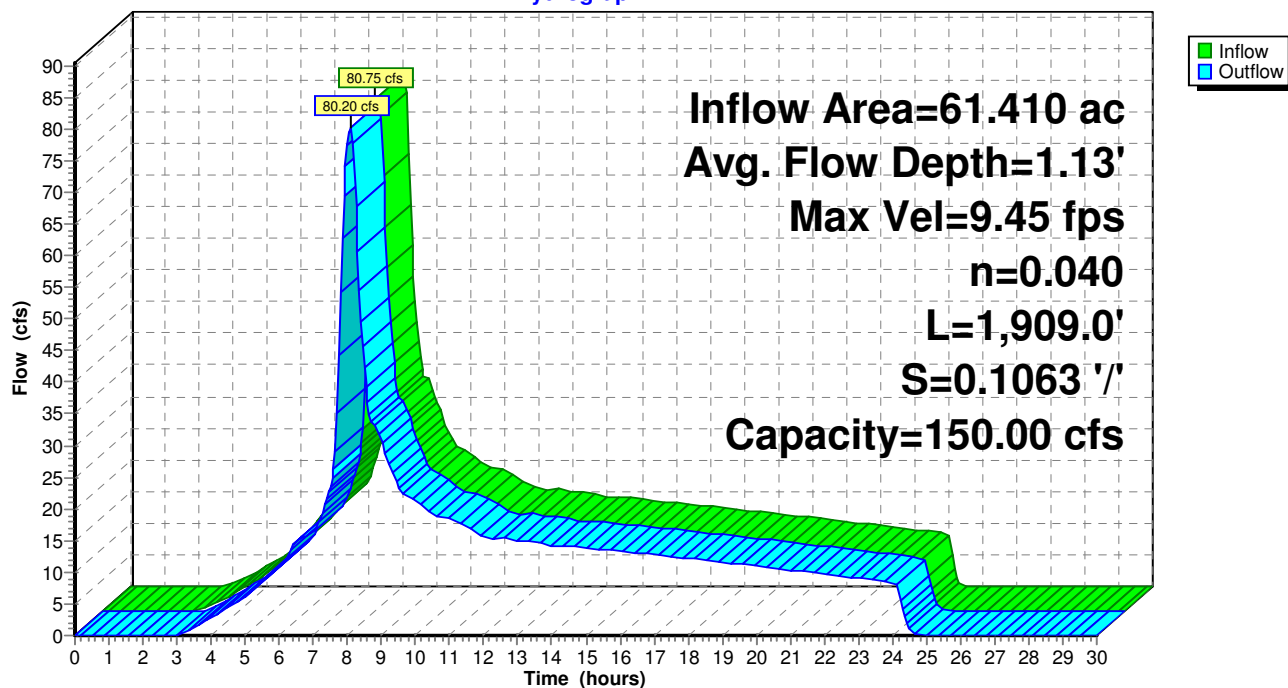
Length= 1,909.0' Slope= 0.1063 '/'

Inlet Invert= 685.00', Outlet Invert= 482.00'



Reach R1: REACH 1

Hydrograph



Ovid Post-Project

Prepared by PPI Engineering.

HydroCAD® 10.00-17 s/n 09429 © 2016 HydroCAD Software Solutions LLC

Type IA 24-hr 100-YEAR Rainfall=8.45"

Printed 7/11/2018

Summary for Reach R1: REACH 1

Inflow Area = 61.410 ac, 1.75% Impervious, Inflow Depth = 5.93" for 100-YEAR event
Inflow = 92.97 cfs @ 8.00 hrs, Volume= 30.338 af
Outflow = 92.44 cfs @ 8.09 hrs, Volume= 30.338 af, Atten= 1%, Lag= 5.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Max. Velocity= 9.81 fps, Min. Travel Time= 3.2 min

Avg. Velocity= 4.88 fps, Avg. Travel Time= 6.5 min

Peak Storage= 18,004 cf @ 8.03 hrs

Average Depth at Peak Storage= 1.21'

Bank-Full Depth= 1.50' Flow Area= 13.5 sf, Capacity= 150.00 cfs

3.00' x 1.50' deep channel, n= 0.040 Mountain streams

Side Slope Z-value= 4.0 '/' Top Width= 15.00'

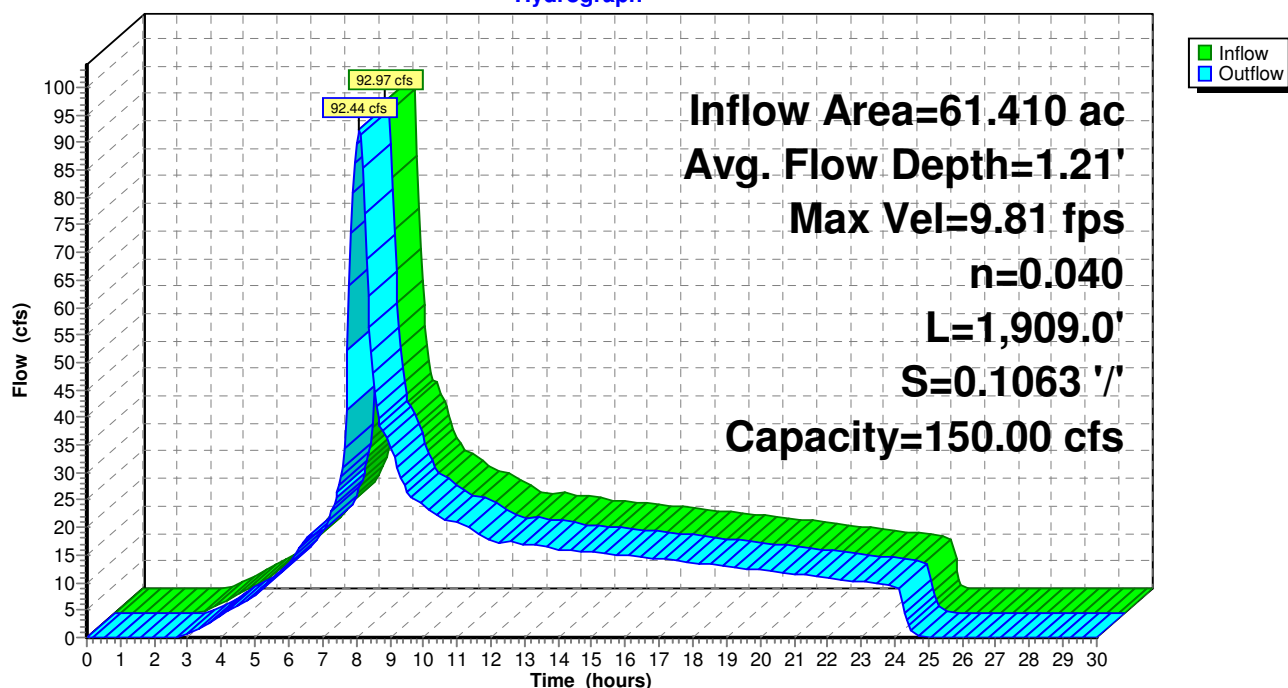
Length= 1,909.0' Slope= 0.1063 '/'

Inlet Invert= 685.00', Outlet Invert= 482.00'



Reach R1: REACH 1

Hydrograph



Ovid Pre-Project

Prepared by PPI Engineering.

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Type IA 24-hr 2-YEAR Rainfall=3.89"

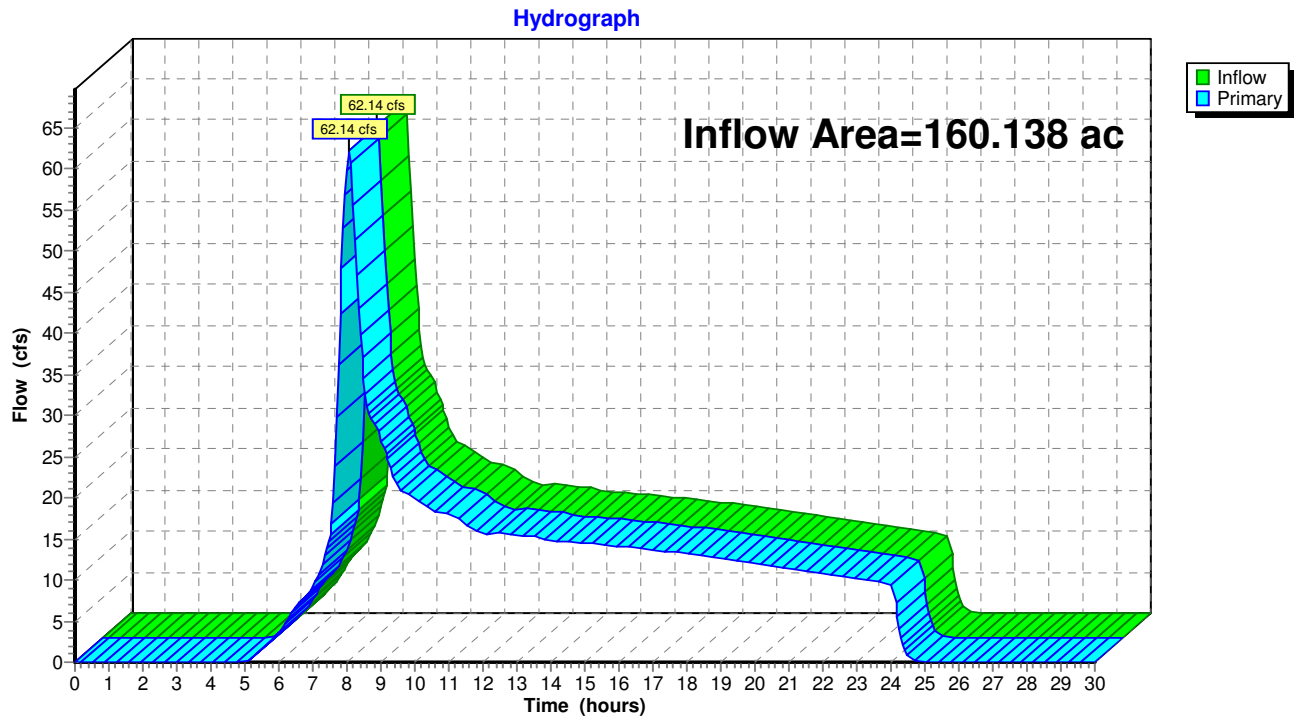
Printed 7/11/2018

Summary for Link WS 3 & 4 OUT: WATERSHEDS 3 & 4 OUTLET

Inflow Area = 160.138 ac, 0.68% Impervious, Inflow Depth = 1.78" for 2-YEAR event
Inflow = 62.14 cfs @ 8.08 hrs, Volume= 23.797 af
Primary = 62.14 cfs @ 8.08 hrs, Volume= 23.797 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link WS 3 & 4 OUT: WATERSHEDS 3 & 4 OUTLET



Ovid Pre-Project

Prepared by PPI Engineering.

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Type IA 24-hr 10-YEAR Rainfall=5.75"

Printed 7/11/2018

Summary for Link WS 3 & 4 OUT: WATERSHEDS 3 & 4 OUTLET

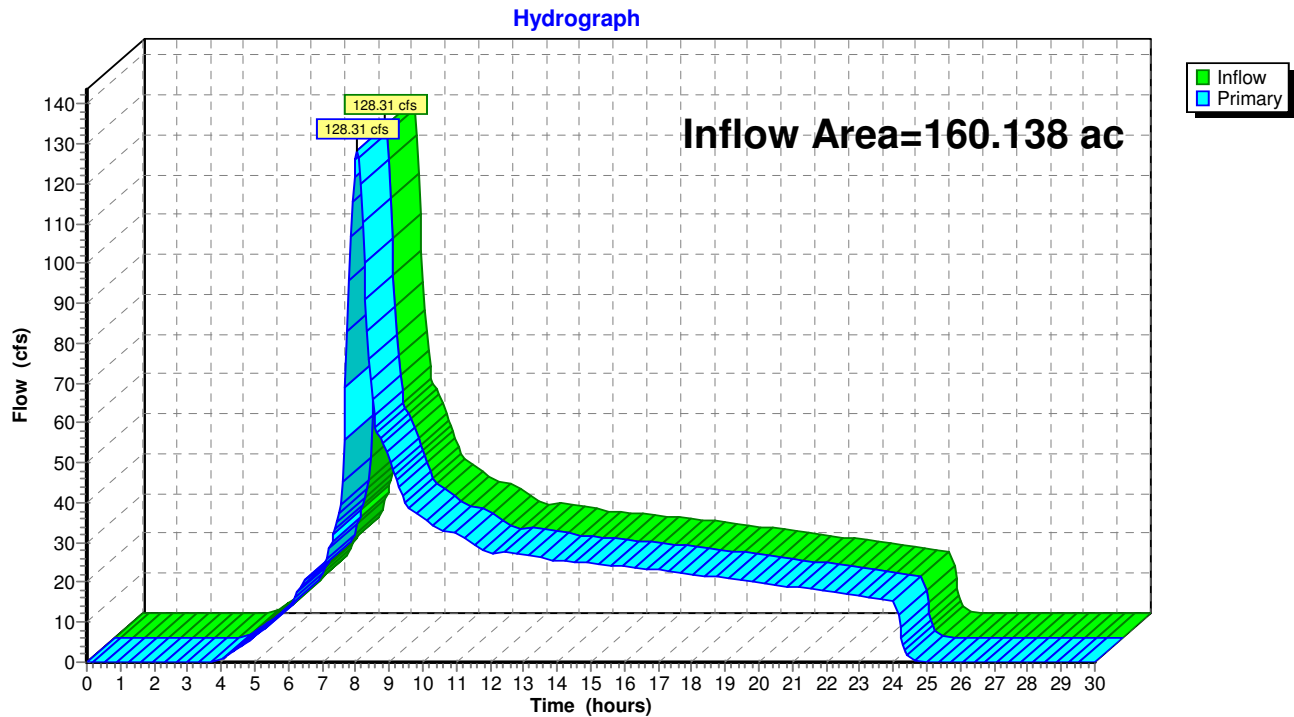
Inflow Area = 160.138 ac, 0.68% Impervious, Inflow Depth = 3.34" for 10-YEAR event

Inflow = 128.31 cfs @ 8.05 hrs, Volume= 44.528 af

Primary = 128.31 cfs @ 8.05 hrs, Volume= 44.528 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link WS 3 & 4 OUT: WATERSHEDS 3 & 4 OUTLET



Ovid Pre-Project

Prepared by PPI Engineering.

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Type IA 24-hr 50-YEAR Rainfall=7.65"

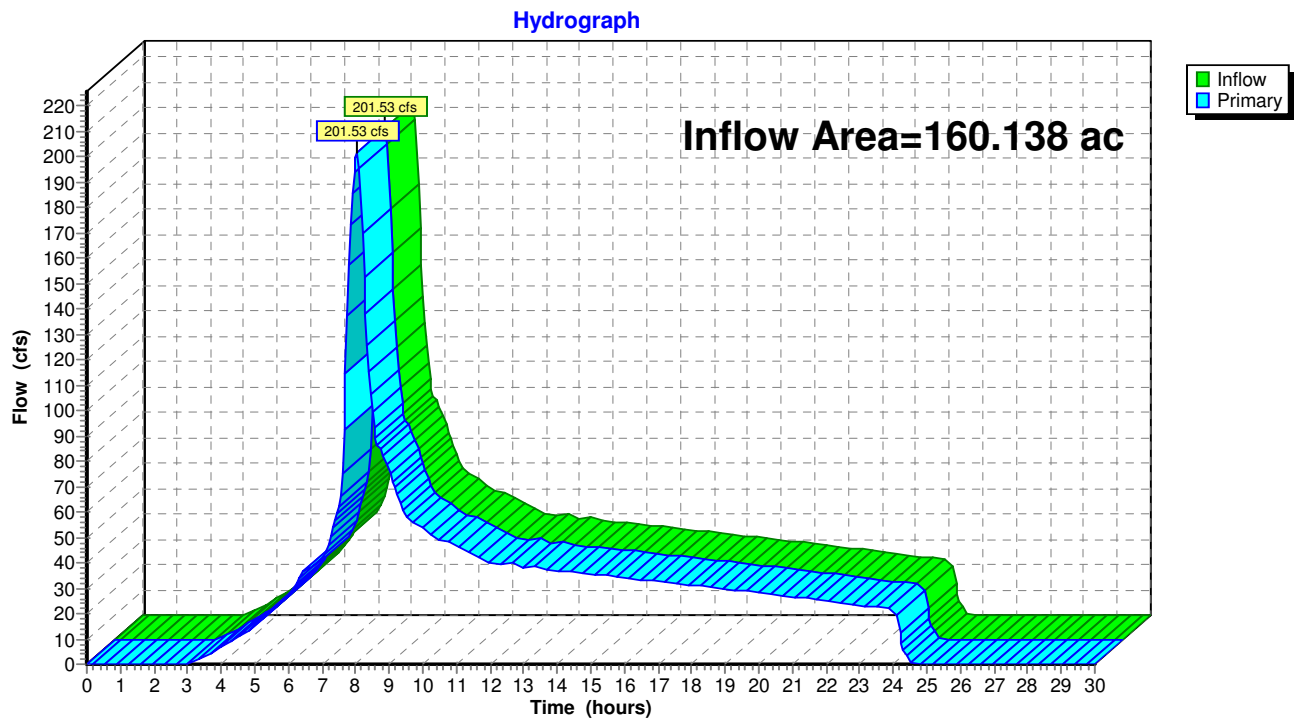
Printed 7/11/2018

Summary for Link WS 3 & 4 OUT: WATERSHEDS 3 & 4 OUTLET

Inflow Area = 160.138 ac, 0.68% Impervious, Inflow Depth = 5.04" for 50-YEAR event
Inflow = 201.53 cfs @ 8.04 hrs, Volume= 67.284 af
Primary = 201.53 cfs @ 8.04 hrs, Volume= 67.284 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link WS 3 & 4 OUT: WATERSHEDS 3 & 4 OUTLET



Ovid Pre-Project

Prepared by PPI Engineering.

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Type IA 24-hr 100-YEAR Rainfall=8.45"

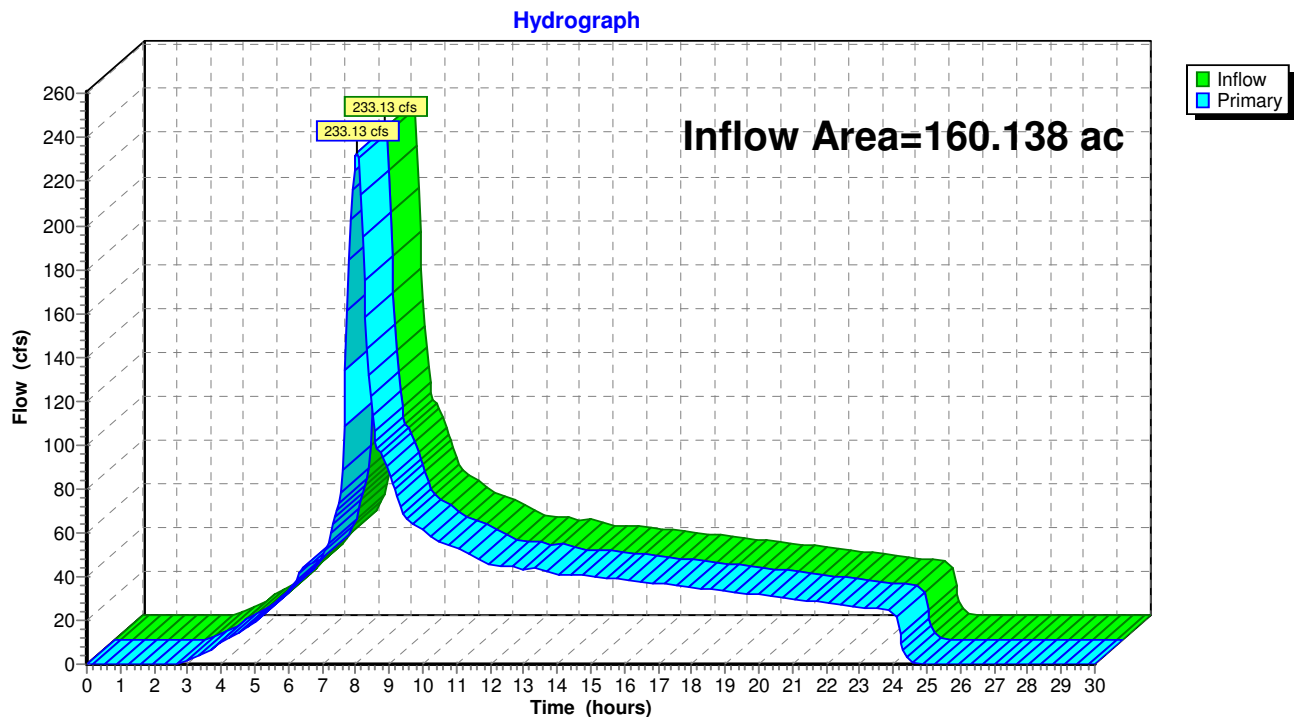
Printed 7/11/2018

Summary for Link WS 3 & 4 OUT: WATERSHEDS 3 & 4 OUTLET

Inflow Area = 160.138 ac, 0.68% Impervious, Inflow Depth = 5.78" for 100-YEAR event
Inflow = 233.13 cfs @ 8.04 hrs, Volume= 77.140 af
Primary = 233.13 cfs @ 8.04 hrs, Volume= 77.140 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link WS 3 & 4 OUT: WATERSHEDS 3 & 4 OUTLET



Ovid Post-Project

Prepared by PPI Engineering.

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Type IA 24-hr 2-YEAR Rainfall=3.89"

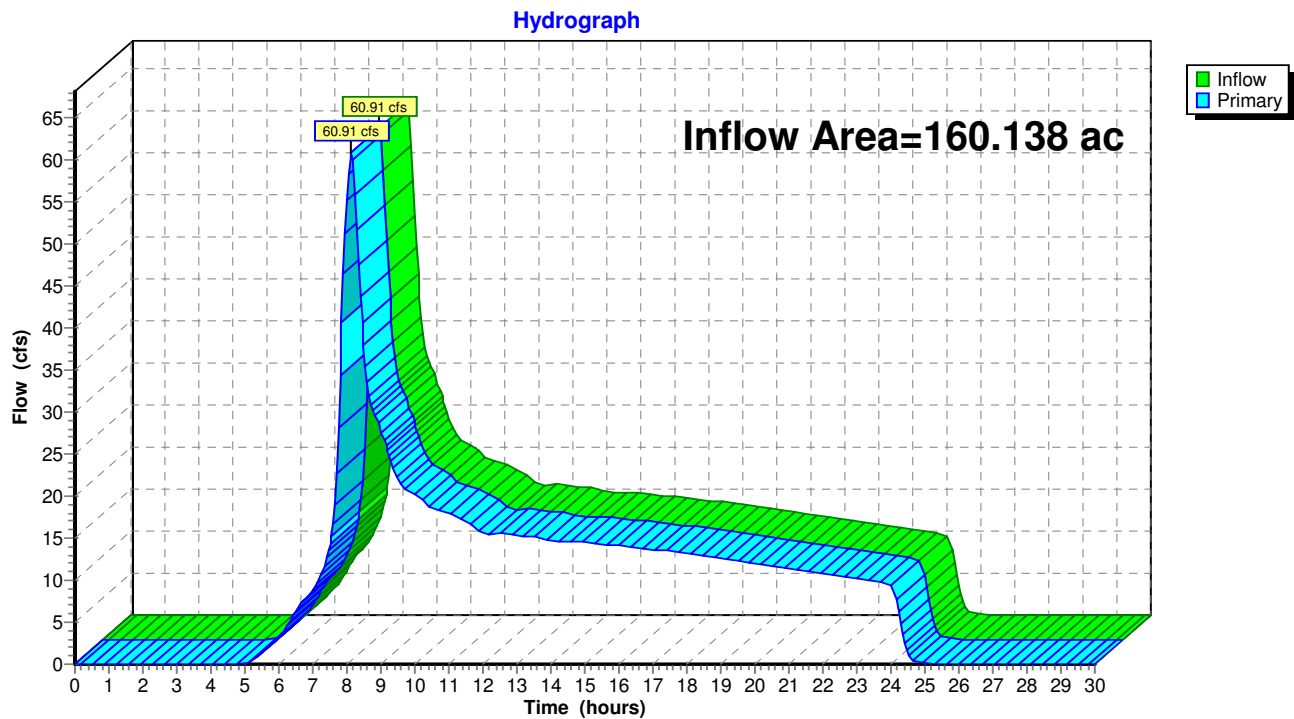
Printed 7/11/2018

Summary for Link WS 3 & 4 Out: WATERSHEDS 3 & 4 OUTLET

Inflow Area = 160.138 ac, 0.67% Impervious, Inflow Depth = 1.78" for 2-YEAR event
Inflow = 60.91 cfs @ 8.14 hrs, Volume= 23.797 af
Primary = 60.91 cfs @ 8.14 hrs, Volume= 23.797 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link WS 3 & 4 Out: WATERSHEDS 3 & 4 OUTLET



Ovid Post-Project

Prepared by PPI Engineering.

HydroCAD® 10.00-17 s/n 09429 © 2016 HydroCAD Software Solutions LLC

Type IA 24-hr 10-YEAR Rainfall=5.75"

Printed 7/11/2018

Summary for Link WS 3 & 4 Out: WATERSHEDS 3 & 4 OUTLET

Inflow Area = 160.138 ac, 0.67% Impervious, Inflow Depth = 3.34" for 10-YEAR event

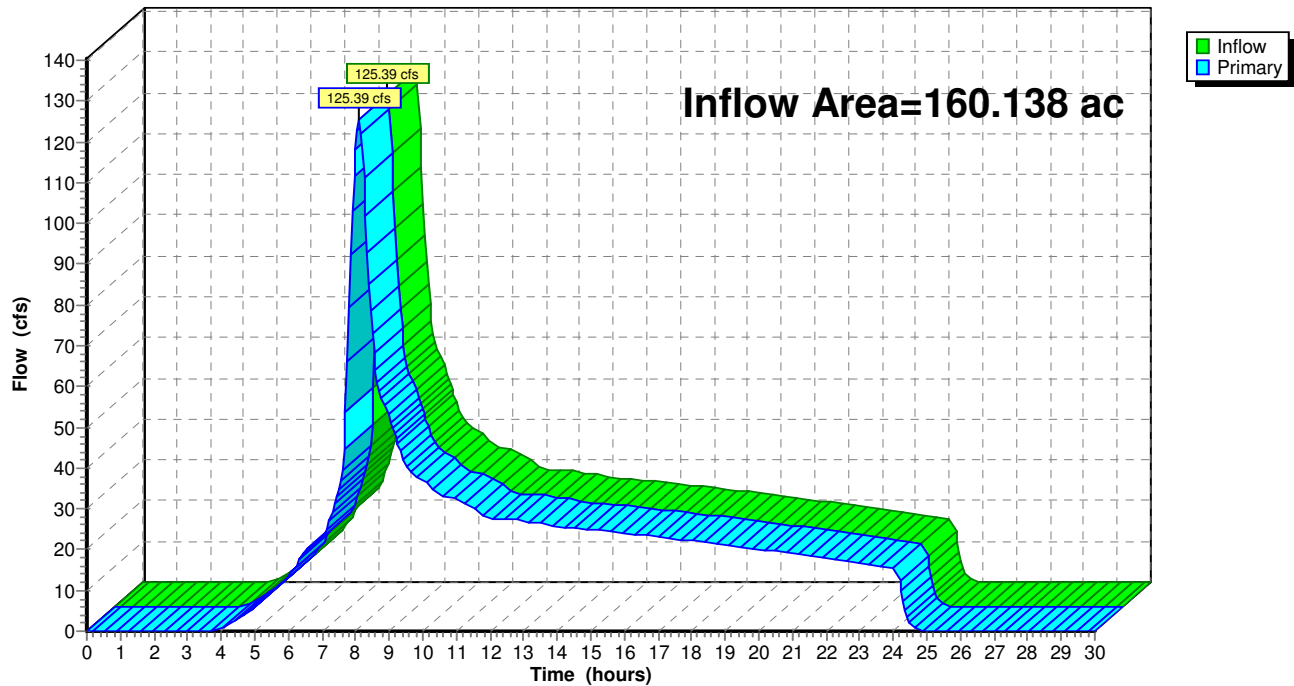
Inflow = 125.39 cfs @ 8.11 hrs, Volume= 44.528 af

Primary = 125.39 cfs @ 8.11 hrs, Volume= 44.528 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link WS 3 & 4 Out: WATERSHEDS 3 & 4 OUTLET

Hydrograph



Ovid Post-Project

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Type IA 24-hr 50-YEAR Rainfall=7.65"

Printed 7/11/2018

Summary for Link WS 3 & 4 Out: WATERSHEDS 3 & 4 OUTLET

Inflow Area = 160.138 ac, 0.67% Impervious, Inflow Depth = 5.04" for 50-YEAR event

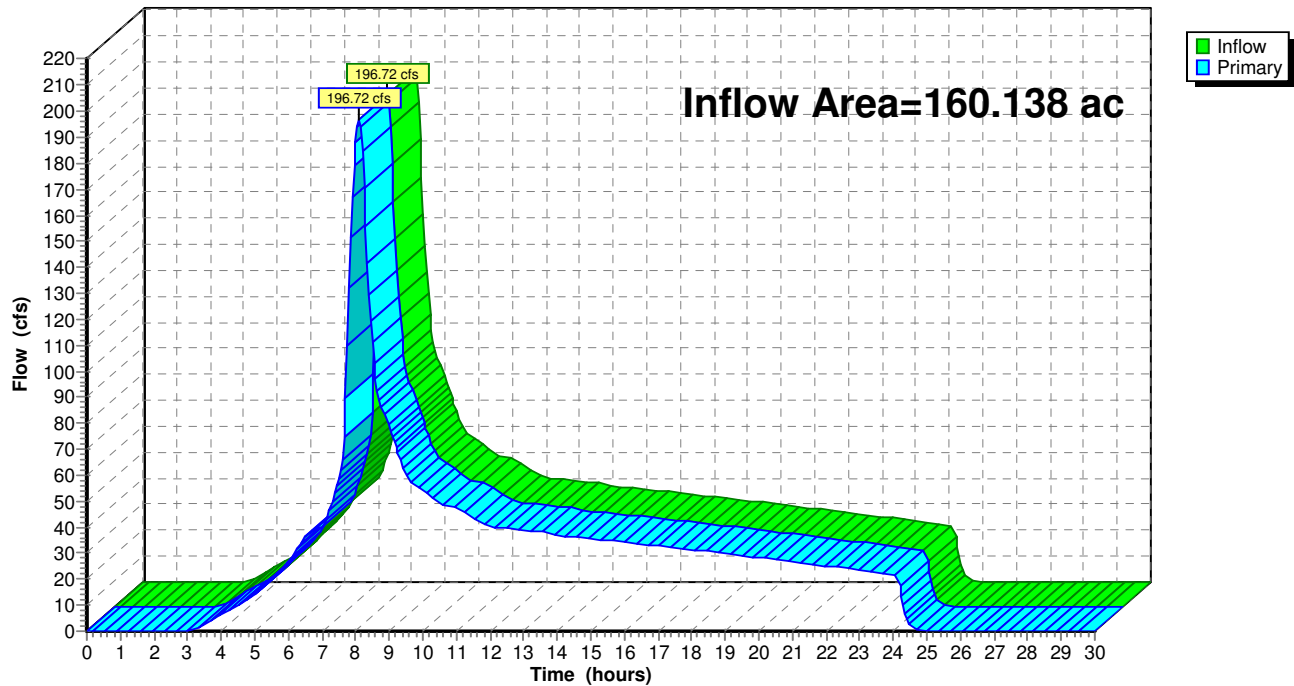
Inflow = 196.72 cfs @ 8.10 hrs, Volume= 67.284 af

Primary = 196.72 cfs @ 8.10 hrs, Volume= 67.284 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link WS 3 & 4 Out: WATERSHEDS 3 & 4 OUTLET

Hydrograph



Ovid Post-Project

Prepared by PPI Engineering.

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Type IA 24-hr 100-YEAR Rainfall=8.45"

Printed 7/11/2018

Summary for Link WS 3 & 4 Out: WATERSHEDS 3 & 4 OUTLET

Inflow Area = 160.138 ac, 0.67% Impervious, Inflow Depth = 5.78" for 100-YEAR event

Inflow = 227.50 cfs @ 8.09 hrs, Volume= 77.140 af

Primary = 227.50 cfs @ 8.09 hrs, Volume= 77.140 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link WS 3 & 4 Out: WATERSHEDS 3 & 4 OUTLET

